Industrial

September 1945

Standardization

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Some 2,000 Industrial concerns hold membership either directly or by group arrangement through their respective trade associations

Readers Write

Standards for Office Equipment

National Office Management Association

Gentlemen: Could NOMA have permission to reprint in the *Forum* your article [Standards for Office Equipment by E. B. Gage, INDUSTRIAL STANDARDIZATION, November, 1939]? It is an excellent article on the very thing we of the Research Committee are striving for.

O. J. McMUNN
Chairman

• • Mr. Gage's article grew out of some discussion in the Company Member Forum of the American Standards Association on standardization of office equipment and supplies. A committee, appointed in 1940 to investigate the possibility of establishing American Standards for such equipment, agreed that the first step should cover principally dimensional standards. Subsequent steps, it was decided, might include grades, qualities of material, finishes, etc. The ASA Company Member Forum, suspended because of the war, is being reorganized (see page 212). It is quite likely that this question will be considered by the new group.

Congratulations to ASA Committees on Safety in the Bakery Industry

American Society of Bakery Engineers

Gentlemen: Subcommittee reports on the biscuit and cracker industry and on dividers, moulders, and wrapping equipment are a very fine survey of the safety needs in respect to these pieces of equipment. I am somewhat astounded by the great amount of fine work that has been done by these committees under your guidance. I did not realize what a fine work your association was doing for and with the bakers, but after reading these reports realize it is a tremendous job and will be of immeasurable value to the industry when and if it can be put into effect.

RICHARDS J. CONLY

Solderless Connectors

Barber-Colman Company

Gentlemen: Kindly advise us which standard applies to the solderless connectors mentioned in Section 4.14 of the December 21, 1944 Electrical Standard issued by the National Machine Tool Builders Association.

ROYCE E. JOHNSON,
Chief Electrical Engineer

• • A copy of the Underwriters' Laboratories specification for Pressure Wire Connectors, May, 1939, was sent to Mr. Johnson, and he was referred for further information to Underwriters' Laboratories, Inc, 207 East Ohio Street, Chicago, Illinois.

The Editor's Apologies to the Textile Color Card Association

Textile Color Card Association

Gentlemen: I am surprised that the answer you publish to Mr. Bell [Read-

ers Write, INDUSTRIAL STANDARDIZATION, July, 1945] did not give the information that the Textile Color Card Association is an authority on commercial standards not only in the textile and allied industries but is so recognized by the United States Government in its development of color standards for the Quartermaster General's office. Our Association was founded in 1915 and one of its purposes is to standardize colors for the benefit of industry, especially since we maintain a Research Associate at the National Bureau of Standards and all of our work correlates with the American War Standard Specification and Description of Color, Z44-1942.

MARGARET HAYDEN RORKE,
Managing Director

• • The editor sincerely regrets having overlooked the Textile Color Card Association (Associate Member of the American Standards Association) in replying to Mr. Bell's request for information about color standards.

Color

Gentlemen: Do you have, or can you tell me where to obtain, a Standard Color Chart, with color numbers, that could be used to compare and list the colors of canary birds?

FRANKLIN J. WILLOCK

• • Mr. Willock was referred to the Munsell system of color notation.

Classification Systems for Special Libraries

Magnolia Petroleum Company

Gentlemen: I am interested in finding a good classification system for a scientific and technological (petroleum mainly) library. All of the principal classifications with which I am familiar will require many modifications to meet our requirements.

HELEN BARRON

• • The ASA Library sent Miss Barron information concerning the first four completed volumes in the Universal Decimal Classification published by the British Standards Institution (for description see INDUSTRIAL STANDARDIZATION, August, 1944). Sale copies of the classification are available from the American Standards Association. Miss Barron was also referred to the American Library Association for additional information.

Our Front Cover

Chemical-resistant gloves and apron protect this workman as he dips a sample of sulfuric acid from the cooling tank, to make specific gravity reading, in the Philadelphia Works of the DuPont Company's Grasselli Chemicals Department. Special close-fitting goggles protect his eyes.

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The Pictures—Cover—E. I. duPont de Nemours & Co; Frontispiece, 197, 198—Glenn L. Martin Co; 210—British Combine, Ltd

September, 1945 Ruth E. Mason, Editor 35 Cents

Standardization is dynamic, not static. It means not to stand still, but to move forward together.

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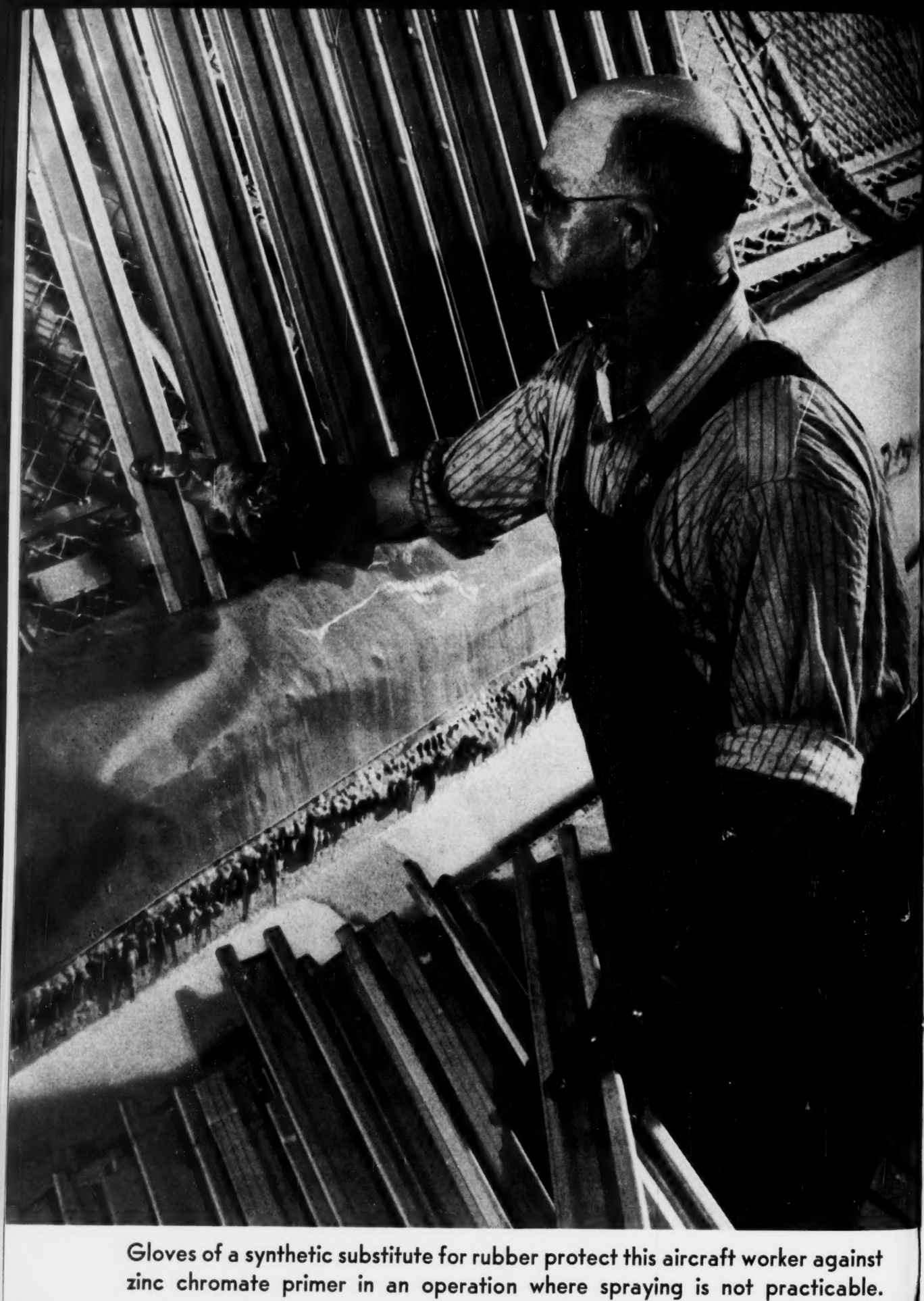


Gloves of a synthetic substitute for rubber protect this aircraft worker against zinc chromate primer in an operation where spraying is not practicable.

Performance Is Criterion in Standard For Chemical-Resistant Gloves

By D. F. Hayes

ASA War Committee puts emphasis on how to determine whether chemical-resistant gloves protect workers

AN interesting problem was presented to the American Standards Association when the War Production Board asked it to develop an American War Standard for chemical-resistant gloves to protect workers and conserve materials.

Rubber, which had always been the best all-around material for protection against acids, alkalies, and organic solvents, had become almost unobtainable for this purpose during the war, and as a result substitutes had to be used.

This was only half the problem, however, for the war had also brought about substitutions for the hazardous chemicals themselves. Thus, in some cases even natural rubber, formerly suitable as a protection against chemicals, had become inadequate.

A group of specialists—men who had an intimate knowledge of the chemical hazards prevalent in industry and the material used in the manufacture of chemical-resistant gloves—was selected to prepare the standard.

The problem facing them was to develop a standard which could be used to determine whether or not a glove made of a synthetic or plastic (or natural rubber) would give the service required when the glove was used as protection against a particular hazard.

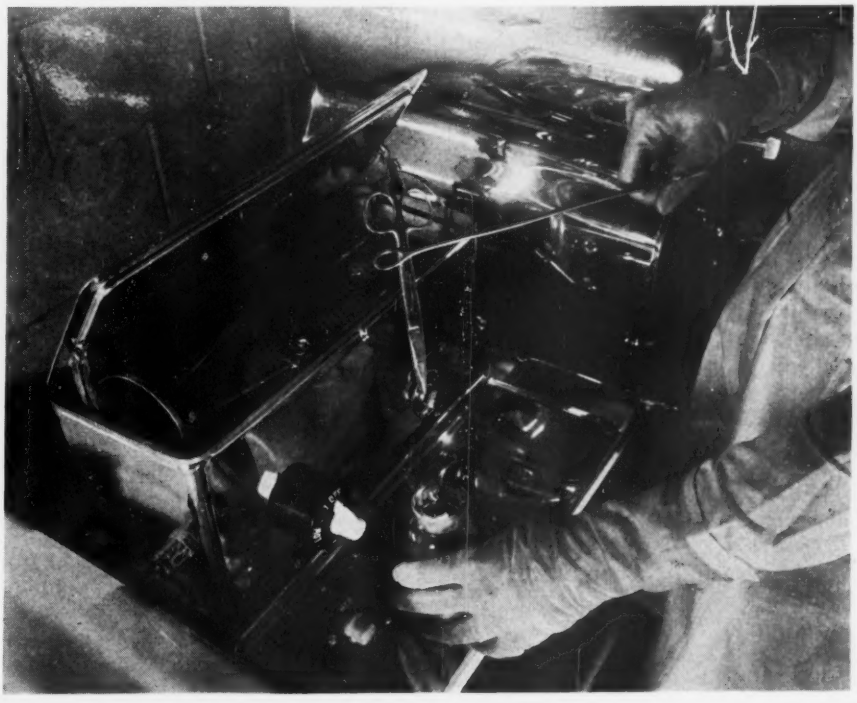
These men came to the conclusion as a preliminary to their work that a standard is a measuring rod against which the product is to be placed, and if a specification contains provisions by which performance and quality of product can be ascertained, even though little may be known about the product itself, it has virtually accomplished its purpose. Therefore, if the performance of the product is to be the measuring rod, they concluded, it is only necessary in drawing up a standard to ask whether a given provision of a specification or test is a true reflection of performance. Any provisions which do not perform this function are generally not important in such a standard, although other matters may also be included for information or instruction.

D. F. Hayes, *Safety Engineer, American Standards Association, served as secretary of the ASA War Committee on Protective Occupational (Safety) Clothing, under which the new standard for chemical-resistant gloves was prepared.*

The committee therefore stressed provisions for testing performance, although it also included some definite specifications in its proposals; i.e., sizes and methods of marking. As a result of this work, the new American War Standard Specifications for chemical-resistant gloves just approved and published by the ASA is an illustration of the fact that "performance" is a highly suitable criterion for use in specifications as well as a tool to guide the development of specifications. It is also an attempt to produce a standard that meets the definition recently recommended for adoption by the American Standards Association, that "a standard shall be sufficiently definitive and conclusive to form a criterion by which one skilled in the art may determine whether material, work, product, process, procedure, operation, or use conforms to the standard."

As a result, detailed tests have been provided in the new standard for determining performance of the glove in actually resisting chemicals, making it possible to determine how well the glove resists specific classes of corrosives. For example, the types of solvents to be used in determining chemical resistance are named. Eight of these types of solvents are listed as solvents to be used in determining the resistance of Class C, organic solvent resistant gloves, including such organic solvents as aliphatic and aromatic hy-

Chemical-Resistant gloves are important in first-aid departments



Subgroup of Experts Prepared War Standard

A small technical committee, with W. F. Weber of the Western Electric Company as chairman, prepared the American War Standard for Chemical-Resistant Gloves. This technical committee worked as a subgroup under the Subcommittee on Hand Protection of the ASA War Committee on Protective Occupational (Safety) Clothing. Stewart J. Owen, National Bureau of Standards, was chairman of the subcommittee. The members of the subgroup on chemical-resistant gloves, who were experts with special knowledge and experience in the problems being considered, were:

W. F. Weber, Western Electric Company, *Chairman*
Paul Belknap, The Surety Rubber Company
Roy S. Bonsib, Standard Oil Company of New Jersey
F. S. Mallette, National Safety Council
M. O. Orr, Miller Rubber Division, B. F. Goodrich Company; R. E. Thomas, *Alternate*
C. F. Ruebensaal, Glenn L. Martin Company
U. S. Navy Department, Bureau of Ships, Code 331

In the work of the War Committee, Walter H. Beidatsch, Office of Civilian Requirements, War Production Board, and Milton Hammer, Safety and Technical Equipment Division, War Production Board, took part in a liaison capacity for their respective governmental agencies.

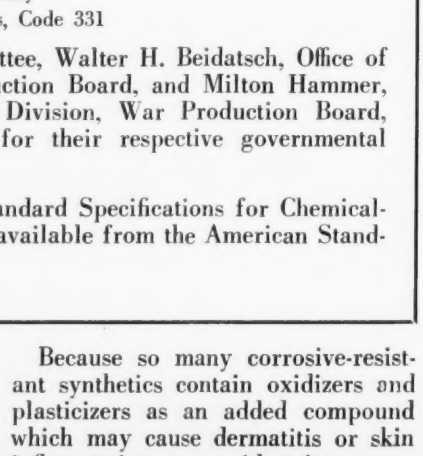
Copies of the American War Standard Specifications for Chemical-Resistant Gloves, L18.29-1945, are available from the American Standards Association at 20 cents each.

drocarbons, alcohols, and ethers. The committee also believed it necessary to develop a group of general physical requirements, the purpose of which would be to measure those qualities which every glove should have regardless of its particular application. To this end, provisions were written into the standard which will be found useful in determining tensile strength, ageing, loss of weight on heating, puncture resistance, and a pinhole test.

All of these, except the puncture test, were based on standards of the American Society for Testing Materials or upon practices in general use. The puncture test may well form the basis of further standardization by standardizing bodies.

This particular performance test (the puncture test) approaches what A. G. Ashcroft has said should be required of every standard; namely, that "it include . . . a precise definition of a testing method" and that "the test results be independently verifiable data . . ." At the same time, it is simple and easy to reproduce. Actually, the test produces a result which is a function of the qualities of tensile strength, resistance to tearing, elasticity, homogenity, and flexibility.

Because so many corrosive-resistant synthetics contain oxidizers and plasticizers as an added compound which may cause dermatitis or skin inflammation, consideration was given to provisions which would tell the user how to measure this undesirable characteristic.



A Common Use for Rubber Gloves in Industry

It is obvious that if the glove itself in being worn produces a sensitivity or actively attacks the skin of the wearer, the product will not be desirable. The committee wanted to provide concise specifications to remove this hazard. However, specifications in this respect depend upon too many variable factors to be included.

This condition is recognized, therefore, in an appendix which contains suggestions for the information of the user, outlining a method of making tests to determine the skin-sensitizing ability of a given glove.

Similarly, lack of experience made it impracticable to include specifications for permeability and for stiffness. The material in the Appendix, therefore, is for the information of the user and indicates that these requirements are recognized.

Work on Protective Clothing Now Completed

Completion of this standard closes out the work on protective occupational clothing begun at the request of the OPA and WPB in connection with the conservation of scarce materials needed in the war effort. During the development of this particular standard, however, there was evidence that as applied to uses in accident prevention, chemical-resistant materials still need investigation. The many new applications of synthetics which are bound to remain available to those interested in economy and safety will need new specifications and methods of test.

Canadian Electrical Manufacturers Organize

The Canadian Electrical Manufacturers Association was organized recently to serve electrical manufacturers in Canada in much the same way as the National Electrical Manufacturers Association functions in the United States. Temporary headquarters are located at 302 Bay St, Toronto.

Roy D. Kerby, executive assistant to the President of Research Enterprises, Ltd and formerly assistant to the president of General Motors of Canada, was appointed general manager.

The Association will strive to increase and improve electrical service; promote standardization; dispense information; cooperate with legislative committees and government departments; and improve and facilitate the production, distribution, and use of electrical products.

Electric Motor Standardization Charts Progress in Industry

By O. F. Vea
Motor Division, General Electric Company

Results of standardization in the electrical industry may offer suggestions for postwar development in other industries; significant proposals for use of standards for growth of industry, nationally and internationally, are made here

WHEN both the purchaser and manufacturer can wholeheartedly and sympathetically discuss jointly the ways and means of establishing or utilizing standard equipments, they are on the threshold of receiving profitable benefits—benefits which will be tantamount to success in the strenuous, competitive days ahead. Yes, cooperation is the essence of standardization, and standardization is just another way of saying that there has been a meeting of mature minds on what is to be bought and sold in the interest of mutual gains. . . .

Electrical standardization by manufacturers started in the motor business in 1908. The first manufacturers' association was formed then, and was known as The American Association of Electric Motor Manufacturers. This association later became the Electric Power Club which ultimately combined with two other newly-formed associations—the Associated Manufacturers of Electric Supplies and the Electric Manufacturers' Council—to ultimately become the National Electrical Manufacturers Association as we know it today.

There is a 176-page book exclusively on NEMA motor and generator standards which represents persistent standardization efforts every year throughout the thirty-seven years of motor industry association work. There is an American Standard (C50-1943) in the form of a book of 125 pages on rotating electrical machinery, resulting from industry-wide acceptance of motor and generator standards.

L. F. Adams, manager of the General Electric Company Standards Division, and chairman of the Codes and Standards Committee of NEMA, estimates that motor manufacturers have spent upward of $100,000,000, and perhaps as high as one-half billion, in effecting standardization—exclusive of advertising and commercial expense—and in accomplishing intelligent acceptance of the standards. Such has been the faith on the part of those concerned in the benefits to be derived by the purchasers of motors and the motor manufacturers themselves.

NEMA's Part in Standardization

The progress in NEMA standardization is reflected by a perusal of the Motor and Generator Standards Manual. NEMA has established standards for all types and kinds of motors and generators, including fractionals, integrals, large and small, a-c and d-c, single phase and polyphase, converters, motor-generator sets, and such specialties as elevator motors, face and flange mountings for motors, farm generator equipments, buffer and grinder motors, etc.

NEMA motor and generator standardization has comprised the following:

Classification—To facilitate the understanding of many different motor types, and hence to expedite the selection of the right motor.

Ratings—To establish a reasonable and adequate number of horsepowers, speeds, voltages, frequencies, and time ratings which have, in almost 100 percent of the cases, met customer requirements and which at the same time have greatly simplified the problem of selection and manufacture. This rating standardization has, to a great extent, helped utilities and machinery and appliance manufacturers to standardize their equipment.

Performance—To provide customers and manufacturers alike with a yardstick for electric motor value which they receive as a minimum for any given rating or type.

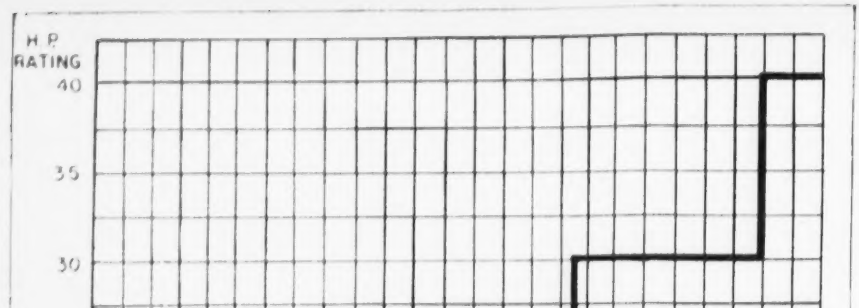
Manufacturing—As a means of predetermining physical and mechanical details of manufacture which are a primary concern to the user—such as frame dimensions, shaft dimensions, pulley and gear sizes, tolerances, terminal boxes, etc.

In addition, NEMA has crystallized conceptions on general subjects, as follows: Application—establishing classifications of operating conditions, establishing standard forms for curves, etc; manufacturing—establishing material classification, lettering for dimension prints, frame numbering, direction of rotation, etc; definitions—full explanation of various terms used in electric motor production.

American Iron and Steel Institute—Standardization of mill-type motors with the steel industry has been a boon both to the steel manufacturers in the high quality and interchangeability of the motors they received, and also to the electrical industry in establishing a means of producing these motors at a low cost,

Significant company standardization affecting motors
Unit-heater fan motors—models reduced from 10,000 to 800.
Oil-burner motor—one motor replaced many motors having 35 different mountings.
Tri-Clad motors—a drip-proof line replacing both an open and a drip-proof line.
Low-starting current motors—a single low-starting current line replacing both a normal and a low-starting current line.
Explosion-proof motors—a complete line from ¼-hp to 1000-hp.
Ball-bearings—motor prices reduced 5 per cent as a result of volume purchases of standard bearings.

NOTE: This article is abstracted from one entitled "What Are the Reasons for Standardizing Electric Motors," published in *Electrical Manufacturing*, August, 1945.



Increase in output from a motor frame of one size, resulting from improved design and manufacture and from standardization

with resultant lower prices to the users.

National Electrical Code Committee and Underwriters Laboratories—Most noteworthy is the development of explosion-proof motor standards and standards of procedure which have given motor purchasers confidence in buying equipment for hazardous conditions, and which have also formed a basis of manufacture of these motors. From this standardization, complete lines of explosion-proof motors, from the smallest to the largest, for use under many hazardous conditions, have been developed.

Electric Light and Power Group—Standardization of motors has helped make possible the standardization of much generating station equipment through the cooperative efforts of NEMA and Electric Light and Power Group, as well as the activities of individual companies. Standardization of voltages and frequencies have helped to stabilize the industrial power market and practically made 220- or 440-volt, 60-cycle power a standard all over the country. Voltage- and frequency-variation tolerance standards have given power companies latitude in the selection of their equipment, thus encouraging voltage regulation within these limits rather than wider ones detrimental to motor users. The very recent NEMA standardization of maximum motor-starting currents will assist utilities in standardizing on suitable line equipment.

National Machine Tool Builders Association—In conjunction with this association, electrical standards for machine tools have been evolved and standardization of new flange-type end-shields and other features is under way.

American Gear Manufacturers' Association—For some time, gear-motor selection has been complicated because of indiscriminate selection of output speeds and differences as to suitable loadings given classes of gears. After many years of effort, principally by NEMA and AGMA, gear-motor output speeds have been standardized, so that only twenty speeds suffice for practically all applications. Application classifications for various gears have also been defined.

Bureau of Ships, U. S. Navy, navy yards; and the U. S. Maritime Commission—Constant contact has been maintained between the electric motor manufacturers and government bureaus, such as those mentioned, to evolve reasonable and useful standards and specifications for such special services as are required in these applications. Agreements as to materials, as to enclosures, as to ratings, and many other things which have naturally aided in a program for increased production and for more reliable use under adverse conditions, have been consummated. Of particular importance is the Maritime Commission's standardization of the unit winch. Currently, standardization of the Corps of Engineers' specification for polyphase motors is being carried on. Standardization of aircraft electric motors is being considered through the Society of Automotive Engineers, the Aircraft Electrical Council of NEMA, and the AIEE.

American Standards Association—The focal point of all industry standards associations, including those in the electrical and other fields, is the American Standards Association. The National Electrical Manufacturers Association is a member of the ASA and is represented on many of its committees. The ASA has conducted a successful program of winning acceptance by other industries for standards primarily electrical, resulting in the establishment of American Standards on electrical rotating equipment.

American Institute of Electrical Engineers—All motor manufacturers have been active participants in AIEE activities which are concerned primarily with engineering advancement in the electrical industry. Naturally, there is a close association between these activities and those of the ASA and NEMA, since a good many of the same people are participants. Although for many years the AIEE published standards of its own for motors and generators, since 1936 it has adopted the American Standards and has not issued any standard separately.

Occasionally, individual electric motor manufacturers have the opportunity of getting together with certain important customers of a given line of equipment and arriving at a design answering a common need among these various manufacturers. Generally this is done individually with each of the companies, although at times it has been accomplished as a combined effort within a group.

Perhaps the most outstanding of all standardization jobs with customers was accomplished by the cooperation of unit-heater manufacturing custom-

ers. Approximately 10,000 different models, some single-speed, some two-speed, some three-speed, some long-shaft, some short-shaft, etc, were replaced satisfactorily for all concerned with only 300 models. Price reductions to customers were substantial, yet this line became a profit rather than a loss line.

Take oil burner motor standardization. Here, one streamlined, conveniently usable, package unit was made so attractive in price, appearance, convenience, and quality that it accommodates over 90 percent of the oil-burner industry's requirements, where previously 35 different mounting ratings were required.

Standardization within a company—Real dividends have been accumulated from the standardization work which throughout the years has been carried on by motor manufacturers themselves. The recommended procedures for materials and manufacture have been standardized. Likewise, the planning departments of the various motor manufacturers are constantly developing jigs, dies, and tools which will permit production-line manufacture with interchangeability of parts.

Motor designers have evolved standard lines of motors with wide customer acceptance through enlightened procedures. There are many striking examples that can be recalled where motors have been standardized after repeated conferences with purchasers, motor specialists, application engineers, design engineers, and manufacturing personnel. Many hundreds of thousands of dollars have been spent by a single company in its standardization done coincidentally with the NEMA standardization of reduced frame size.

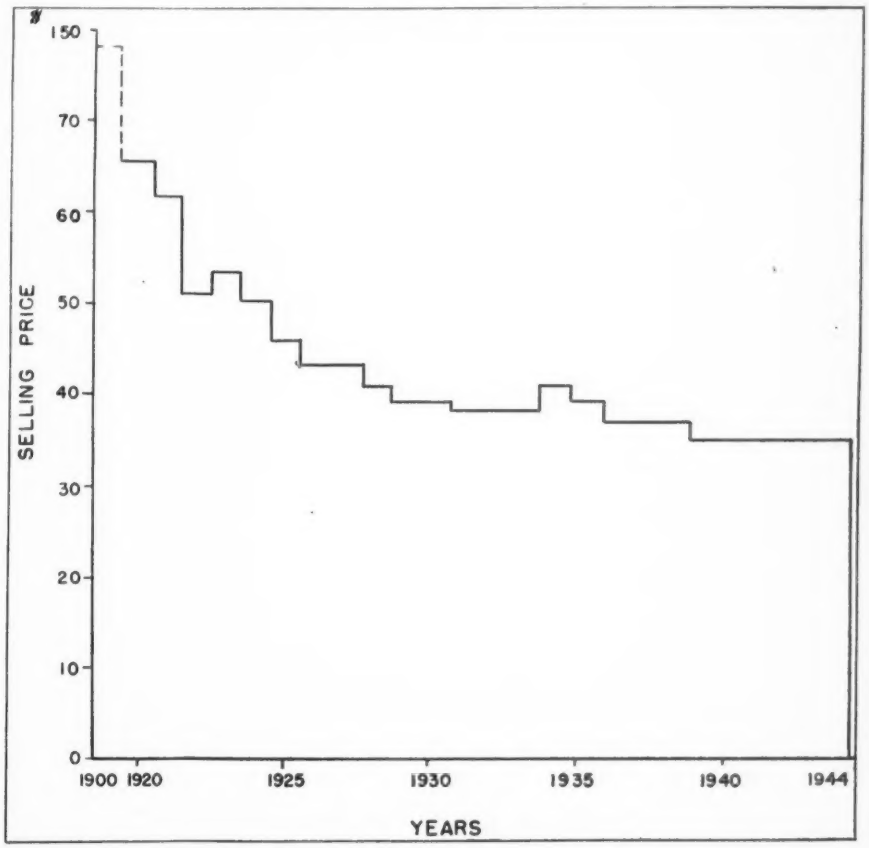
Just as customers have cooperated with electric motor manufacturers, and even urged further standardization of their products, so motor manufacturers, too, by mutual endeavors with their suppliers, have effected standardization of materials and component parts. Purchases of standardized types and sizes of ball bearings have been so channeled that volume production has resulted in lower prices—to such an extent that only this year ball-bearing, integral-horsepower motor prices in smaller sizes were reduced 5 percent to the sleeve-bearing motor level. Activity with steel companies has resulted in the development and universal use of silicon steels as standard lamination material for better quality motors. Standard specifications for aluminum have helped to make possible cast-aluminum rotors for squirrel-cage motors. Grease specifications for motor bearings have been recognized by users and manufacturers alike as of the highest quality.

But all this co-operation and standardization time and expense would not be justified if it did not result in substantial benefits to purchaser and manufacturer alike. Let us summarize these benefits—benefits which have made the standards set-up endure and have encouraged thinking men to recommend continued activity. They are briefly listed in the panels on other pages but are more fully discussed below.

Benefits to Purchasers

Prices—Of paramount importance to all, of course, are cost and price reduction. Most eloquent in summarizing the success in this respect is the accompanying price-history curve of a 1-hp, 1800-rpm motor typifying all induction motor lines. And this price reduction trend was made without jeopardizing a right to make a reasonable profit on motors even over and above standardization development expense. To be sure, there have been times when slight price rises have been expedient in order to meet rising materials and labor costs which temporarily outstripped standardization reductions. But the net result has been down. Noteworthy is the relentless downward trend since the early 1920's, when again standardization was a most important factor. Or take the case of the fractional-horsepower motors. Who in 1920 would have believed that a $28.25 net-price washing-machine motor could at one time be purchased for $6.90 list? Or that a ½-hp motor selling at $38 in 1926 would sell for $25 in 1944?

Quality—Contrary to the belief of some that standardization stagnates design, it has substantially stepped-up quality even in the face of lower prices. "More for their money" has been the actual result. How else could people have drip-proof motors at open motor prices, ball-bearing motors at sleeve-bearing prices, low-starting current motors at normal-starting current prices, enameled wire, cast frames, and dynamically balanced designs all as standard, etc?



This chart shows the reduction in prices of general purpose one-horsepower induction motors, over a period of years.

Actually standardization establishes quality minimums for the guidance of manufacturers and users alike. Standardization is invaluable as protection to the manufacturer who wishes to enter a new field and to the naive purchaser who buys a new product. It forms a basis for accurate comparison. It certifies the equipment representing hall marks of quality and thus makes possible the elimination of substandard equipment.

Availability—Without standardization, shipments are on a custom-built basis and warehouse stocks are a risk. With it, one company can economically justify the warehousing of over 33,000 motors at a total value of $3,500,000, and can set up to produce motors on a maximum load cycle of only six weeks for many sizes and in most instances less, as a consequence of standard material flow. This prompt shipment can be evaluated by processors in terms of maintained or accelerated production and by machinery manufacturers in reduced inventory and shorter turnover.

Convenience—Obvious are the time- and trouble-saving accruals in selection of motors from standardized classifications of motor types and ratings, and in installation and maintenance from standardization of mounting dimensions and rotation and terminal identification consistency. Specifically, the standardization of integral-horsepower motor frame sizes was done for the convenience of machine-tool and automobile manufacturers. It cost the motor manufacturers an estimated $10,000,000 and has quite likely saved users many times that.

Service—Prompt replacement of a motor or availability of repair and renewal parts is assured, even after years of operation, for standardized lines of equipment. The most striking example of this is the exchange plan on fractional-horsepower motors made by one manufacturer, which has been made feasible through standardization. It has been found economical to put motors on this super-fast and convenient service plan when 25,000 units of the same or closely related types have been built.

Safety—With motors as well as other electrical apparatus, the protection of users has been enhanced through the attention given safety features by both the manufacturers themselves and the standardizing bodies. What better evidence is there than the development of explosion-proof motors for use in hazardous locations? Also, cooler motors, oil-tight bearings, and adequate insulation have made motor drive, from a fine standpoint, about the safest drive available.

Benefits to Motor Manufacturer

It simplifies, reducing the number of sizes, the variety of processes, the amount of stock and the paper work that so largely account for the overhead cost of making and selling.

It conserves, saving on the losses from defects, left-over pieces and inadequate tools that must accompany odd-lot manufacture, by allowings large-scale production of standard designs. Each step in this direction justifies better tooling, more careful design, and more precise controls, all conserving both time and materials.

It promotes greater ease of marketing and distribution.

It makes for a smoother running organization.

Philosophy of Motor Standardization

These benefits and the many standardization achievements in a field so intricate as motor manufacture might not have been so substantial had not activities been guided by a basic philosophy. This philosophy could be summarized as follows:

(*a*) The customer must benefit as well as the motor manufacturer.

(*b*) The product should be standardized—not the commercial procedures or prices as in the case with European practice.

(*c*) The emphasis will be on physical and mechanical standards rather than on electrical characteristics.

(*d*) Quality is the key objective—making possible the culling out of substandard equipment.

(*e*) At no time shall standardization involve an agreement not to build anything and everything and thus limit a justifiable choice on the part of purchasers.

(*f*) Engineering designs must not be frozen and thus prevent improvements such as reduction of size, improvement of operating characteristics, etc. This is usually assured by the standardization of maximums or minimums, but not both. For example, the standardized values of minimum starting torque values represent the dividing line between substandard and standard. There is only the economic ceiling to the degree of quality which a manufacturer can supply. As that quality increases, a new standard may more nearly describe a standard motor and the standard itself should be changed.

(*g*) In any simplification by combination, the standard adopted shall include the qualities and use features of the line eliminated; e.g., drip-proof for open motors, etc.

(*h*) Support standardization with price benefits—with price additions consistent with costs for special features, and with service benefits such as exchange plans.

(*i*) Work constantly so to define and promote motor uses and to simplify manufacture, design, and distribution on preferred sizes and types that the economies of volume production can be realized.

(*j*) Encourage the sale of those specials which promise a reasonable volume in order to meet necessary user requirements and to stimulate design improvements.

(*k*) In manufacture within the factory, achieve simplification by maximum use of common parts, employment of methods using common tools, utilization of preferred number series for fewer sizes, and standardization of suppliers' materials and parts.

Determining Proper Timing

The two standardization techniques which determine proper timing are:

1. *The merchandising technique:*

It presupposes that the motor manufacturer has a product which he is so confident fulfills a basic need that he can proceed with its design and production on a standardized basis, and then merchandise the product so aggressively that it wins widespread acceptance in substantially its original form with only minor modifications. It then becomes the industry standard.

2. *The evolutionary technique:*

This method is a result of evolution and timing. It is more costly and laborious, but is also more conservative. It recognizes three stages of standardization development. The first one is individual development by machine designers. This is a period when competition of ideas is paramount. (Motor standardization at this stage is undesirable.) Next is consolidation of position and emergence of the best idea, with imitation by other manufacturers. This is the

period when competition on price, quality, and delivery prevail. (The ideal time for launching motor standardization.) The third stage is the standardization period. Two to three years are usually necessary for the majority of manufacturers to change over, due to cost of redesign, field service, etc. (It usually entails combined industry standards participation.)

Standardization is a dynamic thing requiring constant effort in line with new developments and new objectives. Motor and generator standardization yet to be accomplished is considerable and falls into four general classifications as follows: (1) Revision of present motor standards; (2) Greater emphasis on that standardization which benefits distribution as contrasted to manufacturing and use; (3) More consciousness on the part of all purchasers of the benefits of buying standard equipments; (4) International standardization. These are further discussed in the following paragraphs.

One of the greatest errors that can be made by either party to standardization, the motor manufacturer or the motor user, is to consider specific standardizations as permanent things. Such an attitude is the antithesis of progress. Regular review of standards in the light of new knowledge and field experience is a prerequisite of the eternal search for better equipment at lower costs. Take the matter of motor size and weight for a given horsepower, for instance. It is intimately associated with mounting dimensions and interchangeability. It is also directly related to ease of mounting, compactness of arrangement, and low shipping costs from a machine design point of view. But most important, it is a significant measure of the progress in motor-design art. Stifle the freedom of a motor designer to put more horsepower into a given frame and you interfere with progress just as much as though you prevented an automobile designer from changing his designs more than once in ten years.

One need but look at the accompanying chart showing reduction in motor sizes over the years, to get an indication of how new materials, knowledge, and methods have made possible better utilization of material, and hence the reduced cost and prices previously mentioned. Even today the motor industry is on the threshold of exciting new developments. Inorganic insulations of many kinds, like the silicones, promise to open up new frontiers of high quality and weight saving.

Therefore, while a stabilization over a reasonable period of frame sizes for given horsepowers is recognized by motor manufacturers as being desirable for users, it is equally apparent that when new material utilization inside the motor has reached the point where the outside carcass fits the inside part, like a fat man's coat does a thin man, a frame size re-rating is essential to the benefit of all, user and manufacturer alike.

Some of the benefits that may be expected to result from standardization of motors.

To purchasers—
Lower prices.
Better quality.
Sounder basis for accurate comparison.
More convenience in use.
Greater availability.
Prompter repair and exchange service.
Greater safety.
To manufacturers—
Simplification of manufacture.
Conservation of materials and labor.
Ease of marketing and distribution.
Efficient organization operation.

Another example of the dynamics of standardization is the current study being made of present temperature measurement methods. There are many others, too.

Emphasis on Distribution

Economists are pretty generally in agreement that in the postwar world anything which facilitates distribution will promote business and smooth out business cycles. As a result, there is much to be done on motor standardization which will benefit the distribution of this product. Distribution of motors will, of course, be aided if there are fewer types to distribute. Fewer types will result from a greater combination of types, the final type standardized incorporating the features of the types eliminated. We have seen the elimination of the normal starting current, general purpose motor, and a combination resulting in one low-starting current design. We have seen the elimination of the open motor in favor of the drip-proof motor. Yet, in the picture is the splash-proof design, intermediate between drip-proof and fan-cooled. Perhaps the day will come when it, too, can be eliminated; and perhaps ultimately the establishment of one motor—the totally enclosed, fan-cooled, or its equivalent, will be realized. Already the automobile companies have standardized largely on totally enclosed motors, and this trend seems to be growing.

Distribution is facilitated by setups which permit merchandising techniques. Merchandising is best accomplished through the "packaged" idea. Quite likely more standardization of combinations like present-day gear-motors, motors with built-in overload relays, etc, will facilitate better packaging with resulting benefits to distribution.

Benefits of Buying Standard

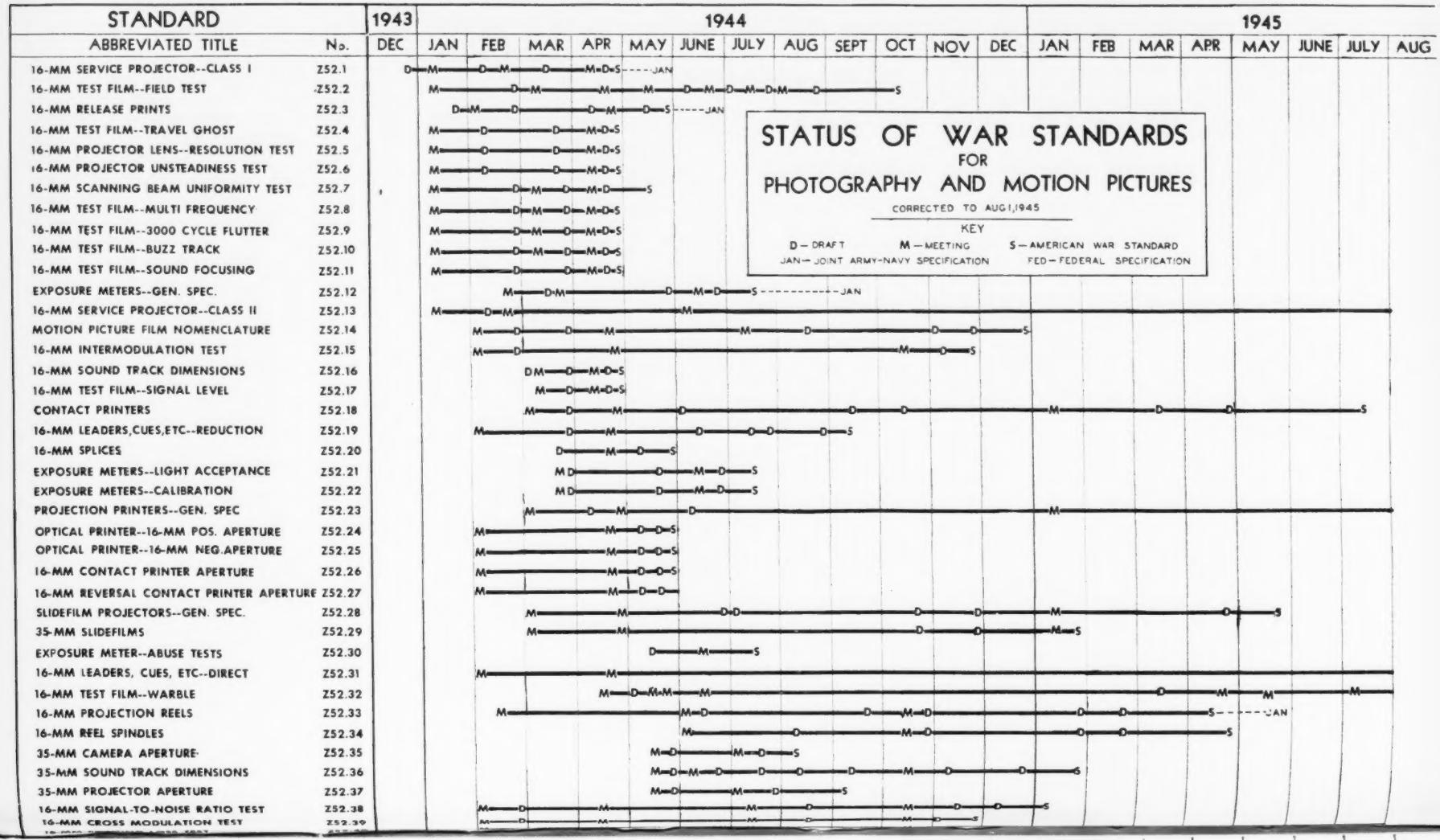
An editorial in the April issue of *Electrical Manufacturing* keynoted a plea for greater consciousness, on the part of all purchasers, of the cost and distribution benefits of "standardizing" their purchases. It is purely a practical approach to the problem of reducing costs for the competitive era ahead. It is not a case of penalizing one's machine design with a compromise motor selection. Rather it is an attitude of not trying to see how "different" one's requirements can be, and how insistent one can be in getting just exactly what one wants, but of seeking cooperatively to integrate motor requirements with those of others in similar activities and with the many preferred varieties of standard and semi-standard motors that motor manufacturers offer.

One need only look at the accompanying chart of the many standard varieties of motors made to see that the selection is not restrictive. And this chart does not include many of the so-called "standardized specials" for specialized products—like jet-pump motors, gas-vending pump motors, and oil burner motors. Such motor units have been and always will be needed. The criterion is: Are the special requirements basically needed for machines of this type as made by most manufacturers, or are they just the very special requirements of but one manufacturer?

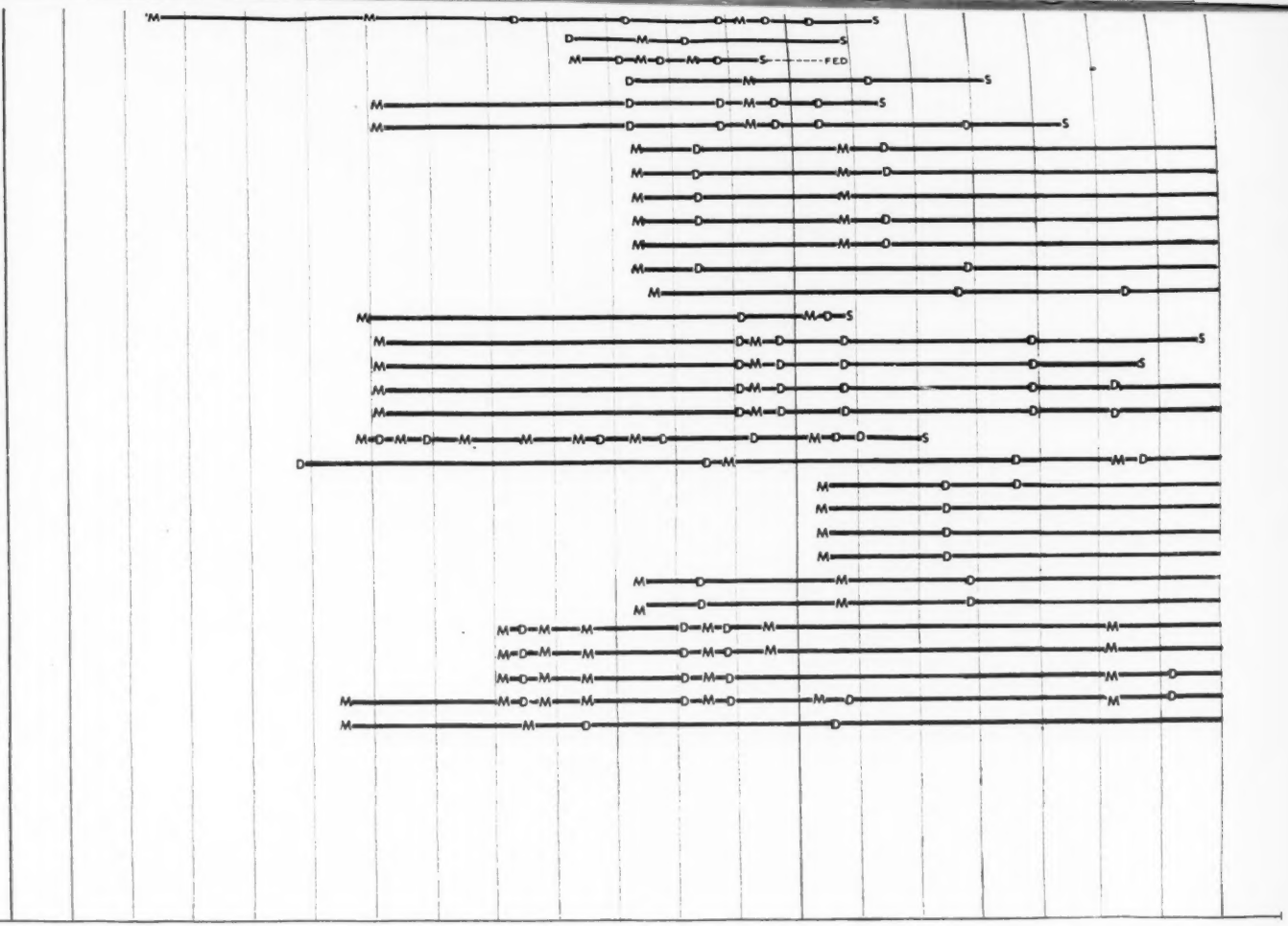
(*Continued on page* 206)

Fast Work by War Committee—

44 Standards Already Completed for Still and Motion Picture Photography



16-MM PROJECTOR APERTURE	Z52.37
16-MM SIGNAL-TO-NOISE RATIO TEST	Z52.38
16-MM CROSS MODULATION TEST	Z52.39
SCREENS--SIZES	Z52.41
EMULSION POSITION IN 35-MM PROJECTOR	Z52.42
FLASH LAMPS	Z52.43
SCREENS--SOUND TRANSMISSION	Z52.44
SCREENS--WHITENESS	Z52.45
SCREENS--BRIGHTNESS	Z52.46
16-MM SOUND CAMERA APERTURE	Z52.47
16-MM SILENT CAMERA APERTURE	Z52.48
16-MM CAMERA VIEWFINDER	Z52.49
16-MM CAMERA LENS--REG. DISTANCE	Z52.50
16-MM CAMERA LENS--DISTANCE CALIBRATION	Z52.51
16-MM FILM MAGS.- 400 FT.GEAR DRIVEN TYPE	Z52.52
SYNCHRONIZATION MARKS	Z52.53
SLIDEFILM PROJ. LENS--RESOLUTION TEST	Z52.55
PROJECTION, SCREENS--SPRING ROLLER	Z52.56
PROJECTION SCREENS--SPRINGLESS ROLLER	Z52.57
PROJECTION SCREENS--FOLDING	Z52.58
PROJECTION SCREENS--FRAME MOUNTED	Z52.59
CAMERA NOISE TEST	Z52.60
OPTICAL FILTER NOMENCLATURE	Z52.61
BETWEEN THE LENS SHUTTERS--MARKINGS	Z52.62
BETWEEN THE LENS SHUTTERS--TESTS	Z52.63
FOCAL PLANE SHUTTERS--MARKINGS	Z52.64
FOCAL PLANE SHUTTERS--TESTS	Z52.65
16 MM FILM MAGS.--200 FT.BELT DRIVEN TYPE	Z52.66
16 MM FILM MAGS.--400 FT.BELT DRIVEN TYPE	Z52.67
35 MM FOCUSING TUBE APERTURE	Z52.68
35 MM MONITOR FINDER APERTURE	Z52.69
35 MM CAMERA LENS MOUNTING	Z52.70
35 MM CAMERA LENS REGISTRATION DISTANCE	Z52.71
CAMERA MOTORS--12-24V. D-C	Z52.72
SENSITOMETRIC CONTROL--16-MM PROCESSING TRAYS AND TANKS	
SYNCHRONIZERS FOR STILL CAMERAS	
SAFELIGHTS AND SAFELIGHT FILTERS	
FLOODLAMPS	
THERMOMETERS	
PHOTOGRAPHICALLY PURE CHEMICALS	



ORGANIZED late in 1943 at the request of the War Production Board, on behalf of the Armed Services, the ASA War Committee on Photography and Cinematography already had one draft to its credit by December of that year, and had completed 44 standards at the end of July, 1945. Twenty-six more are under way.

The outstanding achievement of this war committee has been made possible through the efforts of the many committee members from all branches of the industry and the Armed Forces who are giving their time to the work. The Navy, the Army Signal Corps, the Marine Corps, Army Engineer Corps, Medical Corps, and the Army Air Forces are all helping.

The chart above graphically depicts the record of the work that has gone into the completion of these photographic standards. In each case, several meetings were held, and seldom was a standard completed without the circulation of at least three drafts. In some cases as many as six drafts were considered before agreement was reached on the final standard.

As a result of this war work, standards are now available for consideration as peacetime standards for a wide variety of materials and equipment—including film, cameras, projection equipment, screens, and printing equipment for still and motion picture photography. The peacetime sectional committee is sponsored by the Optical Society of America.

The term "repetitive manufacture" has been used to describe the principle being discussed. The involuntary reaction to the connotation of the word "standard" is thus avoided. There is no cure for high cost like volume. And volume comes from the grooving or consolidation of purchases along established lines.

International Standardization

A relatively untapped machinery market of great magnitude is the export market. The principal obstacle to previous competitive participation in that market has been the adoption in many countries of widely different standards. Most influential are the power standards which have been established. Certainly, there is an opportunity springing from the need for rehabilitation of war-torn countries, as well as expansion of newly developing countries such as those in South America, for progressive action on the part of American utilities and American standards groups to establish international power standards throughout these countries. Any activity along that line by all American manufacturers, as well as by the American Standards Association, should go a long way towards helping to create a free-flowing international distribution.

The disposition of used motor equipment as well as motor-driven machines in foreign countries in the manner now being discussed by government agencies, can help establish power standards which will be essentially similar for all countries. Through the accelerated sale of American motors with American standard features to foreign countries, international standardization is promoted.

Third, accelerated activity on our part through American standards groups should be undertaken to renew the most urgent consideration of international standards by such groups as the International Standards Association and the International Electrotechnical Commission. Also, we must be awake to other national standards activities. Currently, the British are considering the adoption of motor standardization to help them in the postwar era. China, too, is open to suggestions for adoption of American standards.

Finally, there is much to be gained from an industry-sponsored educational program promoting American standards in foreign countries. A step in that direction was recently taken when an introduction to ASA standards for motors was translated into Spanish and Portuguese.

Consumer Studies Show Interest In Use of Standards and Grading

A report just released by the Committee on Consumer Relations in Advertising, Inc, shows that standardization, grading, and labeling ranked high among the questions studied by consumer groups during the war years.

"The interest in postwar problems is most significant since it reflects to some degree the pattern of opinion which may play a considerable part in molding the postwar economy," the report declares.

Among the specific questions studied were:

1. Should programs of standardization, grading, and labeling be extended in the postwar economy?
2. Should there be more government control of business? Greater control over marketing and merchandising practices?
3. Should there be a federal department chiefly concerned with the consumer?
4. How can consumers best achieve their best objectives in a postwar economy? Through organization? (If so, what kind of organization?) Through government? Through education?
5. What sort of business-consumer relations programs should flourish in order to actually make "consumption the sole end and purpose of production?" How can consumers find a way to voice their judgments along with producers and distributors?
6. How shall consumers secure the product information they hold essential to wise buying and intelligent consumption?
7. Is it more desirable to have consumer education and information stem from a multiplicity of agencies or from some central agent, as for example, government?
8. How might the basic requirements of a minimum standard of living be distributed at a lower cost?
9. What will be the significance of international trade developments on the consumer?
10. What will be the character of change in products, housing, etc, in its relation to the consumer?

The *Continuing Study of Consumer Meetings in the United States, War Years 1942-1944*, is one of a series of reports on consumer meetings which were begun by the committee in 1939. One of its objectives is to observe the trend of consumer actions and attitudes. The study analyzes some 1,600 meetings with respect to location, speaker affiliation, and subject or purpose of meeting.

"The analysis reveals above all that consumers have a well-defined interest in informative advertising and selling," the committee declares. "Meetings devoted to buying information, grading and labeling, advertising correction, price protection, and consumers' cooperatives offer strong evidence of this fact. The study suggests the value of further research, especially in the field of informative advertising and selling."

Standards for Electrical Machinery At High Altitudes

At least two basic factors must be understood by the manufacturer and the user of electrical machinery if the effect of altitude on the operation of electrical machinery is to be correctly handled, the National Electrical Manufacturers Association declares. These two factors are: (1) What shall be the standard altitude for basing performance; (2) What correction factors shall be made for deviation from the standard altitude.

Realizing the need for greater uniformity in handling this problem, the Codes and Standards Committee of NEMA organized a Joint Sessions Committee on Altitude. Now this committee has completed its work and has recommended that three standards be adopted by NEMA. These standards cover:

(*a*) A uniform method of calculating the effect of altitude on the dielectric strength of insulation (this contemplates 1 percent reduction in voltage rating for each 100 meters increase in altitude over the standard 1000 meters.)

(*b*) A series of standard reduction percentages in the permissible temperature rise for six arbitrarily numbered classes of apparatus. Each section is to select the class which applies to its product.

(*c*) A formula for calculating windage loss.

Some of the recommendations of the committee, although not all of them, have been acted upon by the sections to which they were transmitted for adoption as NEMA Standards.

Government Asks ASA for Wood Pole Specifications

Depletion of timber supply and expected big demand for poles following end of war restrictions leads to action for conservation of nation's resources

THE American Standards Association has been requested by the government to use its emergency procedure in developing specifications for wood poles made from jack pine, red pine, western white pine, inland types of Douglas fir, western hemlock, western larch, and certain other miscellaneous species.

Prime purpose of this job will be to conserve our natural timber supply; and secondly to channel the production and use of poles so that all purchasers will have a fair share of the available timbers.

"War needs depleted our timber supply to an extent that we do not yet fully realize," says Dr. R. H. Colley of Bell Telephone Laboratories, Inc, who is an authority on pole production and use and one of the country's experts on wood preservation. During the war years use of poles was cut in half by wartime restrictions, leaving a big pent up demand for poles that will hit the market now that the restrictions have been removed. Based on statistical information appearing in the proceedings of the American Wood Preservers' Association this potential demand for poles is likely to run to at least four million poles a year during the next few years. As a result of this situation, conservation of our timber supply is not only advisable but imperative if all pole users are going to get the products they need.

As a further conservation measure the specifications will aim at treatment of every pole with wood preservatives so that poles will last as long as possible. The specifications will, of course, also cover prohibited and permitted defects, such as sap stain, twist grain, insect damage, knots, scars, etc. Such matters as manufacturing requirements, dimensions, storage, and handling will also be covered.

The present government request is no radical innovation. Some years ago the American Standards Association brought together the various industrial groups interested in wood poles and developed a series of specifications and dimensions for the six most widely used varieties. These specifications have been accepted universally and were even used by the Office of Price Administration as a basis for establishing ceiling prices on the principal species and types of telephone, telegraph, and power line poles. The request for a new project in the field amounts to an extension of the previously completed work in order to spread the available supply of wood poles by use of additional suitable species.

The government has indicated in its request for the project that there is a great need for speed in completing these specifications. Therefore, the American Standards Association has already called together an emergency committee which will be headed by Dr. Colley. A meeting of this committee is scheduled to be held at an early date.

ASA War Committee on Wood Poles

R. H. Colley, chairman, ASA Sectional Committee on Wood Poles, 05; Bell Telephone Laboratories, Inc, *Chairman*

W. P. Arnold, Koppers Company, Inc

G. H. Ramsey, National Pole and Treating Co.

C. H. Amadon, Bell Telephone Laboratories, Inc

W. G. Kelley, Commonwealth Edison Co

E. L. Demmon, Lake States Experiment Station

Frank Kaufert, School of Forestry, University of Minnesota

M. H. Sperry, Valentine Clark Corp

J. P. Wentling, Consolidated Treating Co

D. H. Mackay, Rural Electrification Administration

H. P. Seelye, The Detroit Edison Co

T. A. McElhanney, Forest Products Laboratories of Canada

T. R. C. Wilson, U. S. Forest Products Laboratory, Madison, Wisc.

Use War Standard for Pressure-Temperature Ratings on Steel Pipe Flanges and Fittings

A small booklet, designed in shape and size to fit into a pocket in the back cover of a catalog, is being used by Tube Turns, Inc, to give prospective buyers information about allowable working pressures. In this booklet will be included the American War Standard pressure-temperature ratings for steel pipe flanges, flange fittings, and valves as given in American War Standard B16e5-1943. Concerning these American War Standard ratings, the booklet will state:

"Due to the war emergency, the War Production Board requested the American Standards Association to develop revised pressure-temperature ratings to develop the full strength inherent in steel flanges and flanged fittings while preserving the freedom of use of the various types. Such a measure had been before the ASA because of the improved methods of flange design which have become available in recent years.

Probing Calculations and Experience Determine Ratings

"The review of allowable pressure-temperature ratings involves very extensive engineering calculations of a time-consuming nature. In order to meet the desires of the War Production Board, a partial revision of the ratings, arrived at by probing calculations, tempered by the experience of designers and users, was decided upon. The present War Emergency Standard B16e5-1943, Pressure-Temperature Ratings for Steel Pipe Flanges, Flanged Fittings and Valves is the result of this work."

The American Society of Mechanical Engineers, the Heating, Piping and Air Conditioning Contractors National Association, and the Manufacturers Standardization Society of the Valve and Fittings Industry are the sponsors for the peacetime work to which the War Standard is in the nature of a wartime supplement.

Standardization—
An Outstanding Contribution to Engineering Management

By W. R. Hebblewhite

Chief Executive Officer, Standards Association of Australia

STANDARDIZATION is so essential and fundamental a feature of modern industry that it rightly commands a place in the primary studies of engineering management.

1. Plant

The necessity for standardized equipment in the establishment of a factory is too obvious to require much discussion. While there may not be much latitude in the selection of complete units, such as special purpose machine tools, which normally must be taken as designed by the manufacturer, there is considerable scope for effective standardization in relation to the equipment in the designed features of the factory. It may be that with regard to any one type of equipment, such as small cranes or bucket elevators, or any one system, such as color identification of pipe lines, there is real necessity for different designs or schedules to suit the particular function of each section of the factory. Such needs must be balanced, against the great advantages of having standard practice throughout. The cost of spares for replacement, and of the buildings and personnel to house and deal with stores and parts, is one of those items which can eat into profits if not carefully watched, and the savings that can be effected in this direction are so substantial that considerable study in the design and selection of equipment is justified.

A further economy resulting from intelligent standardization of equipment is the saving of time in shutting down of plant for repairs or replacements. A simple example will illustrate this.

In a cement works in which the writer was once engaged there were vast lengths of screw conveyors. The abrasive action of raw meal, clinker, or cement on such conveyors and their bearings was extraordinarily high. It was not uncommon to find the 2¾-inch shafting worn down in the bearings to ¾-inch diameter. Replacements were therefore frequent and as the works operated 24 hours a day, the replacement of a length of conveyor and its bearings meant the shutting down of the whole of that section of the mill, with consequent loss of production. A system of complete standardization of these lengths of conveyor had been established, as also the system of replacement. Rarely was the mill stopped specifically for such a task, but rather the essential stoppages from time to time, as, for instance, for work on the main engines or the kilns or rolling mills were utilized to the utmost. Before any such stoppage, gangs of men were located beside conveyors in different parts of the mill, each with standard lengths of conveyor shafting ready to hand, complete with blades and bearings. Before the wheels had come to a stop the spanners were at work slackening the few bolts remaining in position, the worn lengths were pulled out, the new ones placed in position, coupling and holding down bolts screwed down, and in a matter literally of minutes the new gear was ready to start its work. That, I submit, is sound use of standardized equipment and procedure by engineering management.

2. Supplies

The problem of supplies represents a large proportion of the problem of manufacture. It originates with the designer, who must select the materials suitable for his purpose and base his design upon their characteristics. Supplies must be available in the desired quality, in ample quantity, at all times, and with quick delivery. Unless these conditions are met, production will be impaired; when they are met it is almost equivalent to saying that standardized materials are being used—materials that are standardized either by national agreement or by trade practice.

The designer should, therefore, arrange to utilize, in his designs, standard materials in all cases unless he can show conclusively that a special material is absolutely essential for his purpose. The standard materials will simplify the task of management all along the line of production. The designer is familiar with its properties and knows what may be expected of it both under the cutting tool and when in operation on its job. The supply officer will find it normally easy to secure in sufficient quantities without delay. The successive officers and operatives through the various processes of manufacture know from experience its pecularities and how to handle it. And on the question of costs it is always cheaper than a special material. No standards advocate will deny that there are many occasions when special needs must be catered to. It is equally true, however, that many engineers so fancy the role of individualist that they not only decline too often to adhere to standards, but they multiply their own specifications to a degree which is quite unwarranted. The result of this unsound management is an over-frequency of headaches and difficulties with consequent loss of efficiency.

3. Production

This, of course, is where the really big field for standardization is found. It is difficult to conceive of efficient management of mass production factories without the highest possible degree of standardization of materials, parts, and methods. In an address last November to a Joint Meeting of the Institute of Radio Engineers and the Radio Manufacturers Association, New York, Mr. J. L. Cornell said:

"Every progressive industrial plant is carrying on standardization of its products and processes, and its competitive success

depends largely upon the cleverness and thoroughness with which it has studied these problems. Sound plant standards are an essential to mass production."

When such standarization exists there is scope for many of the modern aids to efficiency, such as time study and payment by results, line assembly, and statistical quality control. Special mention may be made of the last of these which is not so widely known as the others. Statistical quality control enables management to discern trends which may lead to excessive rejections, before the loss occasioned by such rejections occurs. It is, therefore, a means of saving material and manpower, factors of considerable importance to management. The technique can rarely, if ever, be applied effectively to custom built jobs, but is most useful as applied to repetitive operations. It is essentially, therefore, an ally of standardized production. Naturally it has found wide application in relation to munitions and has been extensively adopted throughout the Empire and the United States, through almost uniform standards, as a valuable aid to the allied war effort.

How standards for plant equipment, manufacturing supplies, products, and processes, result in more efficient management and more economical production

In relation to production, standards are also of assistance in the matter of subcontracting for the supply of unit parts. If stock lines of standard quality and dimensions be used for bearings, couplings, gears, and even less commonplace components, such as motors, it may be expected that there will be not only lower costs and speedier deliveries but also less detailed inspection and greater assurance of satisfaction.

This may appear to be a stressing of the obvious, but it is nevertheless illustrative of the influence of standardization on management, and the fact that it is trite merely emphasizes how fundamental standardization has become in modern production methods.

4. Sale

Standardization assists the seller as much as the buyer and the advantages which have been quoted as applying to a purchase transaction have equal significance from the vendor's viewpoint. In tendering, particularly, the element of doubt attaching to an unfamiliar specification is eliminated when a standard is the basis of the transaction and production has been designed to meet the requirements of that standard.

5. Staff and Labor

One of the most important and and most difficult of the responsibilities of management relates to labor. An essential feature of low overhead is the maintenance of a staff of skilled operatives and their continuous employment on profit-making tasks. In industries engaged on the production of goods subject to a fluctuating or fickle market there is an element of instability which makes the maintenance of an even flow of production by accumulating stock during slack sales periods a definite risk. When, however, demand has been stabilized by a reasonable measure of standardization this risk is minimized and the labor problem has been greatly relieved.

6. Standards in a Defense Service

An interesting tribute to the essentiality of standardization in engineering management in a service department is given by Rear Admiral Cochrane, Chief of the Bureau of Ships, U. S. Navy, in a journal just to hand from America.[1] He says—

"But to return to the broader aspects of the problem of standardization, it is, as I have already indicated, indeed a case of carrying coals to Newcastle to urge the importance of standards on naval personnel during the period of immediate preparation for, and actual conduct of, hostilities. If any of us had lacked a complete appreciation of the true importance of standards, the lessons of our war experience would have corrected the deficiency most convincingly.

"Perhaps more forcibly than any other single development of the war, the importance of standards has been brought home to us in connection with the problem of keeping our ships in every quarter of the globe adequately supplied with what the navy originally—and to my way of thinking, unfortunately—elected to call "spare parts," and which we are now referring to as "repair parts." Here again exact dimensional standards and quality standards are absolutely indispensable. I speak with great feeling on this point because today my Bureau is faced with the almost overwhelming task of supplying repair parts for the nearly 100,000,000 shaft horsepower of steam, Diesel, and gasoline engines which are propelling the ships of the United States Navy all over the world today—not to mention parts for thousands of other items of equipment. This represents the most complex procurement problem with which we have yet been confronted. It requires standardization of materials of requisite quality, standardization of manufacture to exact tolerances, standards of marking, standards of packing to assure that the materials will remain in suitable condition for use despite storage for months on end under the trying conditions of the tropics, standards of storekeeping, issue, installation and operation, standards of acceptability, wear and tear, and return for salvage of used parts, standard methods for reporting usages and expenditures and for translating these reports into further procurement adequate to maintain the necessary flow of replacements. Hundreds of millions of dollars are being expended on this effort and I am happy to be able to say that so far at least we have been able to meet the needs of our ships so that they have not been forced to drop out of the battle line for any lack of repair parts. We have, however, in this respect been running on a slender thread of security, and the success of the effort to date could not possibly have been achieved without standardization, spelled with a capital S."

[1] INDUSTRIAL STANDARDIZATION, Jan. 1945.

7. Standards for Management

This brief survey of the significance of standardization in relation to various phases of engineering management is merely a reminder of conditions well known to you. It may be of interest now if I touch on another aspect of the subject, namely standards relating directly to management. These are a more recent development and are creating a considerable amount of interest.

In 1943 the British Standards Institution announced a program of standardization in relation to Factory Office Systems, covering the following items:

Factory production and control methods
Costing systems
Industrial purchasing
Storekeeping
Receiving
Dispatching
Invoicing
Pay roll methods
Office practice and organization.

Some of these may be challenged as not coming within the scope of engineering; but if engineering management be interpreted as the management of a complete engineering factory, then they may reasonably be regarded as an aid to such management. A prospectus of these publi-

Canberra, the capital of Australia. The Parliament House, Government offices, and the Hotel Canberra are shown in the foreground.

cations illustrates this. It states:

"The object of these booklets is to bring to the attention of those engaged in the management of productive engineering enterprises those methods which are generally considered to be the most efficient in dealing with the clerical side of works production and organization. Care has been taken to define principles whilst at the same time suggesting a choice of practices to suit varying needs. The attempt to make available throughout the country a knowledge of the best factory organizational practices, involving a simplification of the clerical work involved, is an essential move towards achieving maximum production.

"The general principles of Production Control will be enunciated and it will be demonstrated how the introduction of an efficient system tends to remove obstacles to smooth and efficient working.

"The essence of efficient manufacture is orderly administration in the factory, which has given rise to the science of production control. Under war conditions when factories may be doing new and unfamiliar work, it is more than ever necessary that duties and instructions should be clearly stated and precise. Muddle is the 'fifth column' in the factory and is in general the result either of misunderstanding or partial understanding of responsibilities and duties, and it is hoped to make clear by analysis and definition the whole scope of what is generally known as 'production control.' Experience has shown that inadequate planning and organization in factories results in delay and confusion and consequent inability to deliver by the promised dates. Other results springing from the same cause are the overloading of some machines while others stand idle, as well as the sudden discovery of shortage of stocks. In general, ways will be suggested of eliminating the overlapping of effort and the inaccuracies and inadequacies of clerical records, which wastefully occupy the time of managers, engineers, and foremen instead of leaving them free to devote their time and energies to the supervision and the improvement of production technique.

"The information essential to put into operation any system of production control should be prepared in a form which makes comparison easy and rectification comparatively simple. For example, recommendations will be made for the recording of machine utilization, to show how many hours each machine is kept working, how many hours it is idle, and the number of hours lost through breakdown, etc. This and similar essential information and the method in which it can be most effectively recorded will be dealt with."

This, it will be seen, is standardization applied directly to functions of management. That it has been welcomed is shown by the extraordinary rush that followed a press notice about one of the standards published in this series. The extent of the sudden demand was unique in our experience and we found it necessary to reprint the publication in Australia rather than await new stocks from Great Britain.

In conclusion it may be said in brief that standardization means doing things in an orderly and well-coordinated manner, which is one of the prime essentials in effective management.

New Standards from Other Countries

THE following new and revised standards, received recently by the American Standards Association from other countries, may be borrowed by ASA Members from the ASA Library or purchased through the Sales Department.

Canada

Enamelled Round Copper Magnet Wire C84.1-1945 50¢
Vinyl Acetal Insulated Magnet Wire C84.1-1945 50¢

Great Britain

New British Standards

Airbricks and Gratings, Dimensions and Workmanship BS493:1945 75¢
Asbestos Cement, Slates and Sheets BS690:1945 75¢
Asbestos Cement, Spigot and Socket, Flue Pipes and Fittings (Heavy Quality) For Heating and Cooking Appliances BS835:1945 75¢
Asbestos Cement, Spigot and Socket, Rainwater Pipes, Gutters and Fittings BS569:1945 75¢
Asbestos Cement, Spigot and Socket, Soil, Waste and Ventilating Pipes, and Fittings BS582:1945 75¢
Capillary Fittings and Compression Fittings of Copper or Copper Alloy for Use With Light Gauge Copper Tube BS864:1945 75¢
Concrete Cylindrical Pipes and Fittings Including Manholes, Inspection Chambers, and Street Gullies BS556:1945 75¢
Draining Boards, BS1226:1945 75¢
Expanded Metal (Steel) For General Purposes BS405:1945 75¢
High Silicon Iron Castings BS/STA 25 1945 25¢
Hinges BS1227:1945 75¢
Light-sensitive Film and Paper For Recording Instruments (Excluding Film and Paper for Document Copying Work) BS1193:1945 75¢
Manhole Step Irons BS1247:1945 75¢
Methods of Testing Clay Building Bricks BS1257:1945 75¢
P.V.C. Cables and Cords For Switchboard Panel Wiring BS1231:1945 40¢
Sluice Valves For Waterworks Purposes BS1218:1945 75¢
Valve Fittings For Compressed Gas Cylinders BS341:1945 75¢
Wallpapers BS1248:1945 75¢
W. C. Flushing Cisterns BS1125:1945 75¢

Drafts of Proposed British Standards

Asphalt Tiles for Paving and Flooring CH (BMB) 226
High Carbon Steel Gas Cylinders for Carbon Dioxide, Nitrous Oxide, and Ethylene CH (CH) 1376
Manganese Steel Cylinders for Carbon Dioxide, Nitrous Oxide, and Ethylene CH (CH) 1377
Mastic Asphalt for Damp Proof Courses and Tanking, Natural Rock Asphalt Aggregate with 6-10 Per Cent Bitumen CH (BMB) 41
Mastic Asphalt for Flooring Natural Rock Aggregate With 6-10 Per Cent Bitumen CH (BMB) 40

Proposed British Standards (Continued)

Natural Rock Asphalt Tiles CH (BMB) 225

Protection for Iron and Steel Used in Building Construction CH (IS) 22

Single-Speed Polyphase Squirrel-cage Motors for Lift Operation CH (ME) 1034

Soot Doors CH (HHB) 828

Thermal Insulating Materials for Heating and/or Hot and Cold Water Supply Installation for Dwellings with a Water Heater Power of not greater than 40,000 B. Th. U's/hour CH (SF) 356

Wood Door Frames and Linings CH (TIB) 739

Wood Surrounds CH (TIB) 982

Wood Trim CH (TIB) 560

Drafts of Proposed British Standards for Comment

Gas Cooking Installations CP (B) 462 1945 75¢

Installation of Gas Operated Refrigerators CP (B) 459 1945 40¢

War Emergency Standards

A.C. and D.C. Motors and Generators (Excluding Shipborne and Airborne Machines) BS1156:1945 75¢

A.C. and D.C. Switchboards and Motor Control Equipment (Excluding Shipborne and Airborne Machines) BS1220: 1945 75¢

Drafts of Proposed War Emergency Standards

Electroplated Coatings of Nickel and Chromium on Brass and Steel CG (CH) 8982 1945

New Zealand

War Emergency Standards

Simplified Practice for the Manufacture of Women's Footwear NZSS E.73 (SP) 1945

Economies from Standards Urged by Railroad Committee

THE advantages of simplification and standardization obtained through WPB limitation orders will be continued by the railroads if a recommendation made by the Committee on Standards and Simplification of the Association of American Railroads in a recent report is accepted. Stock items eliminated from the railroads' Stores stock as a result of such WPB orders should not be reinstated until the departments using them establish a definite need for such items, the committee recommends.

Standardization of catalogs should be referred to the American Standards Association to "progress through such channels as it may appear possible to develop more uniform catalogs both in size and contents," the committee also recommended in its report. Because of the wide variety of sizes of catalogs and the difficulty of filing them for ready reference, the committee is of the opinion that two sizes, one approximately 8½ in. by 11 in. and the other a half size, 5½ in. by 8½ in., would be satisfactory for ready filing and reference.

The American Standard on Spring Lock Washers, B27.1-1944, was discussed in the committee report, and it was recommended that it be included as a Recommended Stock List as Sheet 11-11. The standard was developed through the joint efforts of the American Society of Mechanical Engineers and the Society of Automotive Engineers, and covers four series of carbon steel lock washers.

Recommending that a standard series of fittings be developed for each size of copper tube recognized as standard in the AAR Manual, the committee points to the economy to the railroads of such standardization.

A fairly complete survey of brazing fittings for locomotives made by one railroad, for example, shows the following fittings for use on 14 sizes of copper tubing: 47 brazing connection studs; 11 female pipe thread studs; 13 male pipe thread studs; 6 female pipe thread tail pieces; 14 male pipe thread tail pieces; 24 flanges. This shows an average of 3.3 brazing sleeves for each size of copper tube. For one size of tubes there are five sizes of brazing sleeves with a corresponding number of coupling nuts and accessory fittings. In some cases the same coupling nut accommodates several sizes of brazing sleeves and pipe threaded tail pieces.

To provide one standard piece of each size and each description of these fittings would require 98 items as against 150 items shown, the committee reports. Material savings in special tools and increased quantity production are possible by standardization of these fittings, the report declares. Since there are no recognized standards covering these fittings, locomotive and specialty manufacturers are compelled to develop special fittings for their equipment.

Because of this lack of standardization, the railroad must stock a wide variety of these parts for replacement purposes. Furthermore, the quantity purchased or made of any one size is smaller, and therefore more expensive than if one standard size were provided for each size of copper tube.

The committee's report recognizes the expense and difficulty of establishing a standard of this kind due to the large number of parts now in use, but with due consideration to these difficulties it recommends that a series of standard fittings should be designed for each size of copper tube recognized as standard in AAR Division VI list 14-3 and Division V Manual. The committee also recommends that the railroads insist on the use of these standards on new specialties purchased in the future.

The recommendations are being referred to the Mechanical Section of the Association of American Railroads.

The committee also recommends that recognized commercial specifications for materials, such as those set up by the American Society for Testing Materials, should be used rather than setting up other specifications differing only in minor details.

Simplified Practice Recommendations to be Studied

As a means of continuing such simplification as has been beneficial during the war period, the Simplified Practice Recommendations of the National Bureau of Standards are suggested by the committee. Before these simplified lists are accepted, however, the committee recommends that they be thoroughly studied and used. One of the principal reasons for the varieties of sizes and designs is the lack of readily available information in engineering offices, the committee believes, and it therefore recommends that every possible effort be made to bring about the use of the AAR Standard list as well as those standards shown in the manuals of other lists and manuals.

> Standardization is so essential and fundamental a feature of modern industry that it rightly commands a place in the primary studies of engineering management.
>
> —W. R. Hebblewhite, Chief Executive Officer, Standards Association of Australia.

ASA Members Invited to Suggest New Name for Company Member Forum

A special committee which is studying the possibility of again organizing an ASA Company Member Forum made progress in crystallizing its recommendations at its second meeting September 7. The Forum was the medium through which standards engineers of Company Members met before the war for informal discussions of their company standardizations problems.

Discussions at the September 7 meeting of the special committee indicated that a re-interpretation of the purposes of the Forum might be desirable, to give the new organization a more active role in connection with standards needed by ASA Company Members. It was suggested that this group could be especially valuable to the Standards Council and the various correlating committees, as well as to the member companies, in determining the need for proposed new standards of special interest to Company Members, and in helping to evaluate the urgency of such projects.

With this suggestion in mind, it was tentatively proposed that the name "Company Member Forum" be changed to "Standards Evaluation Committee."

Members of the American Standards Association are invited to send suggestions for a new name for the Forum to Willis S. MacLeod, chairman of the Committee on the Company Member Forum, care of the American Standards Association. All comments will be welcomed.

Iowa University Announces Course In Statistical Quality Control

AN intensive ten day course in Quality Control by Statistical Methods is announced by Dean F. M. Dawson of the College of Engineering and Chairman of its Committee on Quality Control, and by Dean Earl J. McGrath of the College of Liberal Arts at the State University of Iowa. The course will be given November 6-16 inclusive at Iowa City, Iowa.

These statistical methods of quality control are presented in the American War Standards on Quality Control (Z1.1-1941; Z1.2-1941; and Z1.3-1942) developed through the war procedure of the American Standards Association with the cooperation of some of the nation's leading industries, the Army, Navy, and other governmental agencies. Those methods have shown startling results, Dean Dawson announces, in:

1. Aiding in the conversion from production of one type of product to another.
2. Improving quality of purchased materials.
3. Economies in use of labor and materials.
4. Improving quality of final product.
5. Decreasing rejections.
6. Decreasing inspection costs.
7. Improving producer-consumer relations.

The University of Iowa has cooperated with the War Production Board and the United States Office of Education in giving its courses in Quality Control by Statistical Methods. More than 70 representatives of industry from 8 states and officers and employees of the Armed Forces attended the first course at the University last October. More than 70 representatives of industry from 15 states and officers and employees of the Armed Forces from New York to Oregon and from Minnesota to Texas attended the second course at the University in May.

A feature of the proposed course in November is a follow-up program in which two 2-day clinics will be held with the industrial representatives to discuss common problems and to obtain additional information.

Trainees of previous courses held at Iowa have used their training in the following industries: aircraft, candy, electrical, glass, instrument making, mail order, office work, optical, paint, small arms, surgical dressings, textile, tractor, and others. They have used the principle in a variety of plants, from those having more than 5000 employees producing several thousand items per day to plants having 6 or 7 employees producing less than 40 items per day.

New uses are being discovered constantly for the principle of statistical quality control and additional concerns are making use of it as more individuals are trained. It has proved to be particularly desirable when applied to new lines of production and where it is necessary to utilize inexperienced labor.

Two of the basic principles underlying the theory of quality control by statistical methods are *variation* and *measurement*, explains Dean Dawson. It is recognized that no two things are made or manufactured to be exactly the same. The differences between any two articles may be small but they do exist and it is immaterial in the course as to the refinement of the differences. It is also recognized that the variation can be measured in some way. This measurement does not necessarily mean length or width. It may mean such things as the number of stitches per inch of seam, the number of pin holes in a paint job, the number of defects per square inch of cloth, the tension of a spring, the life of a bulb, the pull on a rope or cord without breaking, the percentage of errors on a production line, or the number of pieces produced per unit of time.

One of the fundamental principles of quality control by statistical methods is to undertake to build quality into the product by keeping the various steps in the process within control. Quality can not be inspected into the final product.

The University of Iowa course is designed for executives and persons in an advisory position where the knowledge gained can be applied immediately, particularly quality control supervisors, managers, industrial engineers, production engineers, designing engineers specifying manuacturing limits, persons in charge of specifications for materials, and persons responsible for incoming materials.

Anyone interested should write directly to either Professor Earle L. Waterman, College of Engineering, or to Professor Lloyd A. Knowler, Department of Mathematics, State University of Iowa, Iowa City, Iowa.

Millar Receives IES Gold Medal

Preston S. Millar, president of the Electrical Testing Laboratories, Inc, New York, has been awarded the IES Gold Medal by the Illuminating Engineering Society, the highest honor in the field of lighting.

Mr. Millar is representative of the American Council of Commercial Laboratories, ASA Associate Member, on the Sectional Committee on Household Electric Ranges, C71.

Hayes, ASA Engineer, Chairman of New York Safety Group

D. F. Hayes, safety engineer on the staff of the American Standards Association, has been named chairman of the American Society of Safety Engineers, Metropolitan Chapter, a section of the National Safety Council, for the coming year. As staff engineer for the past two years, Mr. Hayes has been working on standards for safety in the industrial use of x-rays, safety clothing, and on some mechanical standards. He was recently assigned the secretaryship of the Board of Examination of the ASA.

The Engineering Committee of the ASSE is the medium through which local ASSE chapters participate in the development of engineering data and the formation of material of both local and national interest.

Error in Tolerance On "Value" of Color

A typographical error in the article "Can Industrial Color Finishes Be Effectively Standardized?" by D. L. Hadley and C. B. Ryder, published in the July issue of INDUSTRIAL STANDARDIZATION incorrectly listed the tolerance on the value of the standard grays proposed in the article as "plus or minus 0.5" instead of "plus or minus 0.05."

The paragraph on "Tolerances," page 154, should therefore read as follows:

Matching of standard grays, as above, should be limited as closely as practical to the following:

Hue, plus or minus 1.0
Value, plus or minus 0.05
Chroma, plus or minus 0.5

Standards Association of Holland Starts Work for Postwar Production

The American Standards Association welcomes recently renewed correspondence with national standards associations in European countries, cut off for many years by German occupation. A letter from the Hoofdcommissie voor de Normalisatie in Nederland (the national standards association in Holland) stresses the importance of international agreements on screws, screw threads, and screw thread tolerances.

During the war, the HCNN states, committees have been preparing new editions of its standard specifications for screws (bolts and nuts), screw threads (metric and Whitworth) and preliminary specifications for screw-thread tolerances.

It is of the utmost importance to obtain international agreement on these subjects as soon as possible as a preliminary to restarting manufacturing and re-establishing industry in general now that the war in Europe is over, the association declares. As a step toward such agreement, it requests that any new standard specifications on screw threads, screws, and screw thread tolerances be mailed to Holland for study as soon as possible.

In reply the American Standards Association has sent copies of the recently prepared American War Standards on screw threads as well as announcements of the British-Canadian-United States meeting to be held in Canada in September. The ASA also has offered to do everything possible to replace the American Standards and other data lost by the association due to the war. All the association's archives were lost.

Industrial Safety Tomorrow Is Subject Of New National Safety Council Booklet

The need for aggressive safety planning for the reconversion period is apparent to all who fear an increase in the industrial accident toll such as occurred during the conversion period of 1941-42.

To help in maintaining the high level of industrial safety reached during the war, the National Safety Council has issued a report, *Industrial Safety Tomorrow*, analyzing the problem and outlining the elements of an industrial safety program. The pamphlet reflects the findings and recommendations of 38 national organizations sponsoring the program, of which the American Standards Association is one.

Accident prevention in American industries has reached a new high since Pearl Harbor, the National Safety Council reports. Under the patriotic urge to "save manpower for warpower," employers have intensified their efforts; labor has done its part, government agencies, insurance companies, and many other organizations have given encouragement and technical assistance. As a result, fewer workers were killed in occupational accidents in 1944 than in 1941, the last pre-war year, despite increased employment and all the handicaps incident to a war economy.

Nevertheless, occupational accidents in 1944 took 17,500 lives, caused 1,300,000 non-fatal injuries, and cost $2,300,000,000.

The postwar era will present new situations, new problems, and new opportunities in accident prevention. Whether the ground already gained will be lost or whether the gains will be consolidated and extended will depend largely on the forethought and advance planning of the individual plant or company and of the many cooperating agencies.

One of the means recommended for continuing and extending these war gains in safety is compliance with building codes and other legal standards and with the safety codes developed under the auspices of the American Standards Association.

This pamphlet was prepared as an aid to industrial executives and safety directors, public officials, and insurance and other organizations in planning effective measures to hold down the human and economic costs of industrial accidents.

Copies of *Industrial Safety Tomorrow* can be obtained from C. R. Cox, chairman, Committee on Post-War Preparation for Industrial Safety, National Safety Council, 20 North Wacker Drive, Chicago 6, Illinois.

Russian Building Standards Include Data On Wide Variety of Problems

Special standards to meet problems of excessive cold and to guard against earthquake damage are among 800 building standards developed in USSR

THE USSR has developed more than 800 standards for use in building and in the manufacture of building materials, P. Belits-Geiman reports in a recent issue of *Building*, London, England. Of these, approximately 450 are basic standards. In addition, the industry uses more than 1000 standards covering bolts, nails and screws, winches, cranes, and other building equipment, as well as standards for ventilators, motors, and rails.

Russian building standards include general standards, covering units of measurement and classification, terminology, nomenclature, conventional signs, and letters. In addition, 100 standards cover brick, concrete, wood, and metal structures, soil conditions, and foundations in industrial and domestic buildings; and standards for the design of industrial, transportation, and warehouse buildings and installations. Standards for use in designing and planning dwelling houses, hospitals, schools, kindergartens, nurseries, and other domestic and public buildings are also included.

Special Standards for Areas Where Soil Is Always Frozen

Special building standards for areas where the soil is always frozen and for districts subject to earthquakes, problems of particular importance in the Soviet Union, have been developed by institutes of the Academy of Sciences especially assigned to these projects. One series of standards concerns heating, water supply, and drainage. Standards for the construction of bomb and gas shelters for fire protection have been developed as a result of the war experiences.

Approximately 200 standards for building materials and raw materials are accepted by the industry, *Building* reports. Standard measurements and quality requirements have been introduced for bricks, lime, portland cement, tiles, roofing felt, rubberoid, glass, timber, rolled metal goods, and a number of new materials.

In recent years, the USSR has made widespread use of industrial waste materials. Standards have been developed for new kinds of slag cement, bauxite, early-hardening cement, and concrete blocks in which the basic element is slag from boiler and blast furnaces. Another series of standards includes the organic materials used for heat insulation and for walls in the lighter types of houses and subsidiary buildings. There are also standard methods of physical and chemical testing to insure the correct quality standards of the materials. For instance, standard chemical tests for cements and other binding materials, methods of testing and durability of paints, a photo-electric method of testing the polished surface of varnishes, and many others have been developed.

Road Building Program Stimulated Standards

Widespread development of road building has stimulated the development of standards for raw materials and semi-manufactured materials from sand, gravel, rubble, up to curbstones, wood-block and artificial stones for road edges. Fifty standards for hand tools led to mass production with a resultant lowering in cost of 30 to 150 percent, the article declares.

The introduction of the standard brick in 1927 was the first important building standard from the point of view of economy. The new size, 150 by 120 by 55 mm allowed the brick to dry and to bake more quickly, reduced the number of rejections, increased output, cut costs, facilitated speedier construction, and reduced the weight of walls, according to the report in *Building*. Although the walls were lighter, their cross section was still sufficient to answer static and thermo-technical requirements, the article declares. The standard brick saved hundreds of millions of roubles and tens of millions of manhours during operation of the three Five-Year Plans. The manufacture of parts for large buildings conforming to new, improved, obligatory state standards reduced the average construction time from two to three years to a few months.

An effective standard which was adopted for use in designing industrial buildings was known as the "Standard Column Grid," in other words, a standard distance between columns supporting the framework. The standard grid stimulated the design of standard traveling cranes for industrial building which could be turned out by series production instead of the old, expensive method of building each crane separately according to the requirements of the shop.

Adoption of Metric System First Step

The first step toward standardization in building was the change-over to the metric system in September, 1918, the article states. This was especially important in the building trade in view of the fact that, as in other branches of the national economy, several systems of weights and measures were in vogue, which made the standardization of buildings and their components difficult.

The only document on building standards existing before 1918 was the Building Code, adopted in 1869, and articles of the building statutes which gave brief regulations for the design of a few types of domestic and industrial buildings. There were also scanty instructions issued by the Ministry of Railways on the planning of bridges and other civil engineering works.

Research on Building Standards Made Rapid Progress

The change-over to the metric system, the reconstruction of all branches of the national economy, and the mass production of new weights and measures was completed by 1928. From that time on, research on standards for buildings and building materials progressed rapidly under the direction of the All-Union Committee of Standards. As a result, the new USSR system of building standards for all branches of the industry has given considerable impetus to Russian technical and economic development, *Building* says.

Standards No Brake to Progress, Says Aeronautic's Paper Editor

EDITORIAL comment in *Air Transport* against the use of standardization on the ground that it would tend to discourage new ideas and new devices brought a flood of protests recently so effective that the editor is now convinced that standardization for aviation has been "along solid lines." No matter how energetic and comprehensive it may be, the activity for standardization will not be able to catch up with the need for standards, he concludes from the evidence presented by his correspondents.

"An airline committee with the hardworking, idea merchant Harry S. Pack of PCA (Pennsylvania Central Airlines) as chairman, is evolving tentative specifications for cargo, commissary, and passenger-handling equipment," explains the editorial, "Spend a Little To Save a Lot," in the June, 1945 issue of *Air Transport*. "These will be submitted to William Littlewood's aircraft requirements committee and Charles Foresch's airport development committee for consideration, modification (if necessary) and subsequent adoption.

"When we first heard about this we shuddered a bit, suspecting that maybe the airlines would go too far and, by their worthy attempts to standardize, might discourage new ideas and new devices. We find, however, that the recommendations involve such things as the adjustable range of ramps to fit all models of airliners, the diameter of wheels for ramp equipment, and that hard rubber tires should be used.

"We have had in our columns a lot of caution against over-standardization and have received mail in protest on these comments totaling literally 100 times as much wordage as we used. This correspondence and our file on the subject mainly from E. W. Norris of the Aeronautical Chamber of Commerce have led us to the conclusion that standardization for aviation has been along solid lines and that no matter how energetic and comprehensive, that activity will not catch up with the need for it.

"The Pack committee's deliberations thus far have included consideration of in excess of 40 items ranging from covered passenger-loading stairs to fork lift trucks.

"Safety features are being considered both for employees and the public and include such items as deadman controls to keep ramp equipment from denting and putting aircraft out of commission. If properly designed and constructed for safety, utility, and appearance, the first cost of such equipment may sometimes seem unduly high to some airline executives and the CAB. The recent Airline Finance report of three New York banks and an insurance company assumes an average life of nonflying airplane equipment of 16⅔ years. We suggest that 'spending money to save it' is of greater importance than first-cost economy with regard to such equipment."

One of the columns that helped bring the controversy to a head appeared in the column "The Old Air Carrier", *Air Transport*, January, 1945. Presented as a dialog, the argument compared standardization of airplane equipment to the standardization of railroad equipment in an earlier day.

It is reproduced below:

STANDARDS AGAIN

"Some of the boys, including Bob Ayer and Johnny Groves, tell me you are a little too much of a zealot against standardization and I was forced to admit that you probably got your ideas from me," the OAC said.

"Right," we said, but added that it wasn't a case of concurring but sounding off a lot to ourselves before we had heard him and since then using some of his illustrations.

"I'll give you plenty more," our friend said. "The American Standards Association and SAE committees on the subject can point with pride to the millions of dollars they've saved and what they claim is true. Those organizations are expert on the subject and I believe know how far to go and what items can be standardized without stifling an industry. On the other hand, their successes and their publicity could cause the inexpert to go too far. It's natural to think how much easier their jobs would be if only machines, equipment and supplies in which they are intimately involved could also be standardized. They might standardize themselves out of jobs. To get back to the railroad example, I understand that the Erie Railroad had broadgage and was forced to change to standard many years ago. If the U. S. railroads had broadgage now as they had in the Dutch East Indies and, I believe, now in Chile, think how much better off the railroads would be insofar as freight and comfort to the passengers is concerned. They could pack more people in a given train length, have grand pianos in club cars and generally do a better job. Maybe Erie was right and the others wrong? Who knows? This is getting into the metaphysical but I hope and pray that airlines do not carry standardization too far. Don't let anyone unsell you on this theme.

"In the December issue you mention, quoting me, how the railroads suffered by standardization and didn't make much progress for many years until they had some lively competition; there are other reasons for railroad lethargy—I suspect standardization was a major one. It's easier to agree on a standard than change it. I'd say let the French fly, with somewhat higher wing loadings if they want to. Perhaps we would learn from them and would change ours based on French experience. But there should be maximum loadings and stalling speeds agreed to beyond which no one should be allowed to go. Adding payload decreases ton-mile costs geometrically. Five miles added to the stalling speed of some transports can make a ton more payload available. Ten miles, much more than two tons. Get what I mean?"

We nodded that we got the point. Since the cigarette shortage, the OAC is not smoking ours any more but offering an obscure brand of strong aroma. He's still on our matches, however. We lit up for him. "Unsound airworthiness requirements should be guarded against and, I understand, Chicago made progress on that score. But I hope they didn't go too far in agreeing to too definite standards on too many things. It will stifle progress and initiative besides keeping costs up so that air transport will not be the factor it should be in raising the standards of living in backward areas," the OAC thumped the desk and added, "Why don't you write an editorial on standardization?" We said we'd look into it.

BSI Vice-president Pays Visit to New Zealand's Standards Institute

Sir Percy Ashley, vice-president of the British Standards Institution, visited the New Zealand Standards Institute at Wellington, New Zealand, in May, in company with other members of a delegation on textiles. The delegation was entertained at the Parliament Buildings by Mr. Sullivan, Minister of Industries and Commerce, who is responsible for the administration of the New Zealand Standards Institute. More than 100 guests were present, including representatives of the Standards Institute's Council and committees, various Government departments, labor or-

ganizations, and other industrial, trading, and professional interests.

In welcoming Sir Percy Ashley and his colleagues, Mr. Sullivan paid tribute to the British Standards Institution. The soundness and importance of its conception have been best evidenced by the growth of similar organizations in almost every other country in the world, he said. The incalculable contribution that standardization had made to the development of trade and industry and to the advancement of the economy of all countries before the war has been far exceeded by what it has achieved in the vastly increased production during the war, he declared.

Sir Percy Ashley replied by stating that the British Standards Institution will welcome any proposals for closer collaboration or more effective coordination of its work with that of the New Zealand Standards Institute. The BSI is resuming its work on the standardization of dairy requisites and equipment and at the request of the Ministry of Agriculture is undertaking standardization of farm machinery generally. He requested the active collaboration of the New Zealand Institute.

Many people have the curious idea that standardization means making everything the same—clothes and houses identical in appearance, and all variety eliminated—Sir Percy said. The ignorance, prejudice, and misapprehension about standardization which had arisen in the beginning have been difficult to dispel because standardization is not spectacular, it is a long term activity, he explained. Results cannot be achieved over a short period. Every relevant factor and value have to be ascertained, correctly interpreted, and expressed, and therefore standardization is generally a long, painstaking, and thorough job.

Canadian Committees Propose Limits for Radio Interference

Committees of the Canadian Electrical Code, Part IV, of the Canadian Standards Association are completing a series of new CSA tentative standards dealing with tolerable limits of radio interference and methods of measurement. It is expected that the Canadian Provinces will soon consider Part IV of the Code for adoption.

Nine tentative standards that will be helpful to Canadian manufacturers in designing and producing interference-free electrical apparatus will be published, the Canadian Standards Association reports. The standards are similar to those of other countries which now have or are planning legislation to prohibit interference.

They are:

C22.4 No. 100—Definitions and General Requirements will include a general Preface, Statement of Scope, Definitions, Legal Status of the Code, and List of Personnel. In addition there will be six appendices: A—Theory of Interference, B—Coupling, C—Psychological Factors, D—Principles Underlying the Suppression of Inductive Interference, E—List of British and Foreign Cooperating Organizations, F—Bibliography of Technical References.

C22.4 No. 101—Measurements of Radio Interference describes the method of measuring both radiated and conducted radio interference in the frequency range up to 30,000 kilocycles. It describes the method of using a calibrated radio receiver as a measuring instrument in order that measurements may be made with the use of instruments which are readily available.

C22.4 No. 102—Radio Interference from Street Railways sets a tolerable limit of interference from new equipment during normal operation.

C22.4 No. 103—Radio Interference from Power Lines defines tolerable limits of radio interference from power and distribution lines operating on voltages between 750 volts and 70,000 volts.

C22.4 No. 104—Radio Interference from Motor Vehicles applies to new vehicles and covers the frequency band from 200 kilocycles to 30,000 kilocycles.

ASTM Cement Standards in One Volume

Nineteen ASTM standards on cement, including both specifications and tests, have been compiled in one volume by the American Society for Testing Materials. The volume is particularly significant since it gives in their latest form numerous tests that have been established separately instead of in the combined form previously issued as C77. Tests for sampling, fineness, normal consistency, soundness, and tensile strength, as well as time of setting, are now issued as individual tests.

The specifications cover natural, masonry, and portland cements, also air-entraining cement for pavements. Extensive methods of chemical analysis are given in addition to other physical tests.

Copies of the 176-page publication, heavy paper cover, can be obtained from the American Society for Testing Materials, 260 S. Broad Street, Philadelphia 2, Pa., at $1.50, with reduced prices on larger quantities.

Building Conference Plans Basic Building Code

Recently, the Building Officials Conference of America, Inc, adopted a resolution to promulgate a basic building code incorporating the best code practices observed in this country. To carry out this resolution, a Basic Building Code Committee has been appointed under the general chairmanship of Albert H. Baum, Building Commissioner of the City of St. Louis, Missouri. The committee will be assisted by a group of consultants.

Standardizing to Cut Costs

"One of the most positive benefits of wartime economy has been the tremendous impetus toward standardization," declares *Modern Industry*, May 15. "Industries are getting together to secure for peacetime the economies and simplification of product and method standardization. They've found it pays.

"Alert management is realizing that long size lines, overextended color ranges, are not competitive aids, but handicaps resulting in unnecessary waste, large inventories, higher prices."

ASA Standards Activities

American Standards

American Standards Available

For new American Standards now available from the ASA, see page 219.

Standards Being Considered by ASA for Approval

Basis for the Coordination of Dimensions of Building Materials and Equipment, A62.1

Basis for the Coordination of Masonry, A62.2

Sponsors: American Institute of Architects; Producers Council, Inc

Approval Requirements for Domestic Gas Ranges, (Revision of Z21.1-1942)

Approval Requirements for Gas Space Heaters (Revision of Z21.11-1942)

Approval Requirements for Gas Water Heaters (Revision of Z21.10-1944)

Approval Requirements for Central Heating Gas Appliances (Revision of Z21.13-1943)

Listing Requirements for Low Water Cutoff Devices, Z21.36

Sponsor: American Gas Association

Method of Compiling Industrial Injury Rates (Revision of Z16.1-1937)

Sponsor: National Safety Council

Standards Being Considered (Continued)

Pipe Threads (Revision of B2.1-1942)

Sponsors: American Gas Association; American Society of Mechanical Engineers

Standards Submitted to ASA for Approval

Automatic Stations, (Revision of C37.2-1937)

Sponsor: Electrical Standards Committee

Addenda to American Standard Approval Requirements for Domestic Gas Ranges, (Revision of Z21.1-1942)

Addenda to American Standard Approval Requirements for Gas Space Heaters (Revision of Z21.11-1942)

Addenda to American Standard Approval Requirements for Gas Water Heaters (Revision of Z21.10-1944)

Approval Requirements for Central Heating Gas Appliances (Revision of Z21.13-1943)

Listing Requirements for Low Water Cutoff Devices, Z21.36

Sponsor: American Gas Association

Screw Threads for High-Strength Bolting (American War Standard B1.4-1942)

Sponsors: American Society of Mechanical Engineers; Society of Automotive Engineers

American War Standards

American War Standards Available

For new American War Standards now available from ASA, see page 219.

American War Standards Approved Since Our August Issue

Picture and Sound Synchronization Marks for 35-Mm and 16-Mm Sound Motion Picture Release Negatives and Other Preprint Material, Z52.53-1945

Auditorium-Frame Mounting Projection Screens, Specification for, Z52.59-1945

Portable-Frame Mounting Folding Projection Screens, Specification for, Z52.58-1945

Sizes of Projection Screens, Z52.41-1945

War Standards Under Way

Cylindrical Fits, B4.1

Manual of Standard Drawing Practice, Z14
- Section A. Foreword
- Section C. General Drawing Practice
  - Subsection 1. Projection
  - Subsection 2. Line Conventions
  - Subsection 3. Sections & Sectioning
  - Subsection 4. Scales
  - Subsection 5. Lettering
  - Subsection 6. Thread Conventions and Methods of Specifying
- Section D. Drawing Forms
  - Subsection 1. Sizes
- Section G. Dimensioning and Placing Tolerances on Drawings
- Section H. Finishes
- Section J. Symbols
- Section K. Abbreviations

Machine Tool Electrical Standards (Revision of C74-1942)

Photography and Cinematography, Z52

Motion Picture Cameras
- Distance Calibration of 16-Mm Motion Picture Camera Lenses, Z52.51
- Field of View of 16-Mm Motion Picture Camera View Finders Having Parallax Adjustment, Z52.49
- Mounting Dimensions for 16-Mm Camera and Recorder Film Magazines (400-Foot Gear-Driven Type), Z52.52
- Mounting Dimensions for 16-Mm Camera and Recorder Magazines (200-Foot Belt-Driven Type), Z52.66
- Mounting Dimensions for 16-Mm Camera and Recorder Magazines (400-Foot Belt-Driven Type), Z52.67
- Photographing Aperture of 16-Mm Sound Motion Picture Cameras, Z52.47
- Photographing Aperture of 16-Mm Silent Motion Picture Cameras, Z52.48
- Registration Distance and Mounting Dimensions of 16-Mm Motion Picture Camera Lenses, Z52.50

Motion Picture Projection Equipment
- Class II Service Model 16-Mm Sound Motion Picture Projection Equipment, Specification for, Z52.13
- Projection Screens (Folding, for Portable-Frame Mounting), Z52.58
- Projection Screens (Auditorium-Frame Mounting), Z52.59
- Projection Screens, Sizes of (Proposed Revision of Z52.41-1945)

War Standards Under Way (Continued)

Motion Picture Release Prints
- Leaders, Cues, and Trailers for 16-Mm Sound Motion Picture Release Prints Processed from Original 16-Mm Material, Z52.31
- Picture and Sound Synchronization Marks for 35-Mm and 16-Mm Sound Motion Picture Release Negatives and Other Preprint Material, Z52.53
- Printer Loss in 16-Mm Sound Motion Picture Prints, Method of Determining, Z52.40

Motion Picture Test Films
- Warble Test Film Used for Testing 16-Mm Sound Motion Picture Equipment, Specification for, Z52.32

Photographic Filter
- Terminology and Nomenclature, Z52.61

Still Cameras
- Exposure Markings for Between-the-Lens Shutters, Z52.62
- Exposure Markings for Focal Plane Shutters, Z52.64
- Exposure Time of Focal Plane Shutters, Method of Determining, Z52.65
- Performance Characteristics of Between-the-Lens Shutters, Method of Determining, Z52.63

Still Printing Equipment
- Enlarger, Photographic, Specification for, Z52.23

Radio Noise, Methods of Measuring, C63

Safety Code for the Industrial Use of X-Rays
- Electrical Protection, Part VI
- Methods and Materials of X-Ray Protection, Part III
- Specific Applications for 400 Kv and Lower, Part IV
- Specific Applications of One and Two Millions, Part V
- Use and Storage of Radium in the Field of Industrial Radiography, Part II

Screw Threads, B1
- Buttress Threads
- High-Duty Studs in Light Alloys
- Instrument Threads
- Stub Acme Threads
- Unification of Screw Threads

Women's Industrial Clothing
- Jackets for Outdoor Wear (Slide-fastener Closure), L17.6
- Jackets for Outdoor Wear (Fly-type Button Closure), L17.5

Wood Poles, O5

News About ASA Projects

Automatic Stations, C37.2—

A proposed revision of the standard approved in 1937 has been submitted to the ASA for approval. The new standard, to be known as Automatic Station Control, Supervisory and Telemetering Equipments, has been referred to the Electrical Standards Committee as sponsor and for recommendation to the Standards Council.

Approval Requirements for Gas-Burning Equipment, Z21—

Sponsor: American Gas Association

Requirements for the approval of gas ranges, gas space heaters, and gas water heaters to meet conditions under which they would operate at high altitudes are being suggested as additions to the American Standards already in existence. Addenda to the three American Standards—gas ranges and gas space heaters approved in 1942 and gas water heaters in 1944—have been submitted to the ASA by the American Gas Association. A proposed new American Standard covering Listing Requirements for Low Water Cut-off Devices, the first time this type of appliance has been covered, and a proposed revision of the American Standard Approval Requirements for Central Heating Gas Appliances, Z21.13-1943, have also been submitted. The revision provides requirements for operation of central-heating gas appliances at high altitudes in addition to new requirements for gas-fired humidifiers.

Building Code Requirements for Fire Protection and Fire Resistance, A51—

Sponsors: National Board of Fire Underwriters; National Fire Protection Association; National Bureau of Standards.

Now that hostilities have ceased, meetings of the sectional committee and subcommittees are being scheduled to push forward the work of this committee. A meeting of the sectional committee has been scheduled for October 26 in New York. It has been suggested that the subcommittees hold meetings during the week of October 22, in advance of the meeting of the sectional committee.

Method of Compiling Industrial Injury Rates, Z16.1—

Sponsors: International Association of Industrial Accident Boards and Commissions; National Council on Compensation Insurance; National Safety Council.

A proposed revision of the 1937 edition of the American Standard Method of Compiling Industrial Injury Rates has been sent to the Standards Council. The proposed revision is intended to clarify the text of the standard to eliminate the possibility of misunderstanding and misinterpretation. It also recommends that anyone having questions concerning individual accidents refer them to the ASA so that an interpretations committee that is to be set up can rule on whether they shall be included. The previous edition had provided that in such cases the rulings of the Workmen's Compensation authority having jurisdiction should be followed.

Screw Threads, B1—

A series of meetings of the war subcommittees and of the general ASA War Committee on Screw Threads was held the week of August 27, preliminary to the international meetings in Canada which will begin September 24 and will last two weeks. Proposals for international standards to be considered at the Canadian conferences were studied by the war committees.

In addition to the standards already under way, a proposal from the British Standards Institution on round threads for sheet metal was presented to the general War Committee for study. This specification, the BSI explained, had been prepared "by the Ministry of Supply, for use by the fighting services in connection with metal containers, plastic fuses, etc."

Screw Threads for High-Strength Bolting, B1.4—

Sponsors: American Society of Mechanical Engineers; Society of Automotive Engineers

The first action toward turning an American War Standard into an American Standard was taken when the American Society of Mechanical Engineers and the Society of Automotive Engineers, sponsors for the ASA project on Screw Threads, submitted the American War Standard for Straight Screw Threads for High-Temperature Bolting, B1.4-1942, to the ASA for approval. Title of the proposed new American Standard will be Screw Threads for High-Strength Bolting. The war standard was prepared to meet the severe requirements demanded by increasing use of high pressures and temperatures in pipe lines and pressure vessels.

Textile Safety Code, L1-1929—

Sponsor: National Safety Council.

The Textile Safety Code is being revised by a reorganized ASA sectional committee. Since its approval in 1929, this code has been a guide to the textile industry in specifying guards for the most common machines used in this field.

Preliminary revisions of the present code will soon be distributed to the committee and to all those interested in reducing hazards encountered in textile manufacture.

A steering committee, which is preparing the preliminary draft, has recognized that since 1929, when the code was approved, new machines have been introduced and processes have been changed, for the protection of which there are no provisions in the present code. Interested organizations will be given an opportunity to consider the inclusion of exhaust systems for dust and fly, minimum industrial lighting values, minimum conditions of humidity, and certain specific guards not now included.

W. B. Weaver, Marshall Field & Company, is acting as the chairman of the reorganized committee. Stewart J. Owen, Jr, of the National Bureau of Standards is secretary. The first meeting of the sectional committee may be held this fall.

Wood Poles, O5—

A new American War Standard project has been organized (see page 00), and the first meeting of the war committee was held September 13 and 14. Proposed standards for Ponderosa pine and related species, Western hemlock, Northern pines, Western larch, and inland fir poles were considered at the meeting.

1944-1945 ASTM Standards on Copper and Copper Alloys

The latest edition of the special compilation of ASTM Standards on Copper and Copper Alloys gives the specifications as of December, 1944. The some 90 standards included are widely used and cover the following groups of materials:

- Wire and cable electrical conductors
- Non-ferrous metals (lead, nickel, tin, copper, etc)
- Plate, sheet, and strip
- Wire, rods, bars, and shapes
- Pipe and tubing
- Alloys for sand castings
- Methods of test for copper and copper alloys (expansion, mercurous nitrate, resistivity, tension, rockwell hardness, etc)

The book is made complete by the inclusion of emergency specifications and emergency alternate provisions applicable to copper and copper alloys. These have been widely used during the war emergency.

Copies of this 444-page publication can be obtained from the American Society for Testing Materials, 260 South Broad Street, Philadelphia 2, Pa., paper cover at $2.75 each.

Hospital Association Standardizes 22 Hypodermic Needles

A standard simplified list of 22 hypodermic needles, reduced from the 50 to 100 needles formerly in use, has been approved and sent to the Co-ordinating Committee and the Trustees for final approval, the American Hospital Association announces.

According to the AHA Committee on Purchasing, Simplification, and Standardization, the 22 kinds and sizes range to meet all needs.

Work on the simplification of hospital supplies and equipment is being carried on by a Committee of the Council on Administrative Practice in cooperation with manufacturers, the American Standards Association, the National Bureau of Standards, and similar agencies. Economies resulting from this work, according to the AHA, have been the manufacture and stocking of fewer items, with consequent savings in transportation, time, and labor.

"In order to make this standard simplified list of hypodermic needles effective," the Association states, "every hospital must co-operate by buying only needles approved for the list. Unless hospital administrators, purchasing agents, department heads, and staff physicians and surgeons limit their purchase and use of hypodermic needles to the 22 types approved there will be no lasting results from the simplification and standardization efforts."

FIVE STANDARDS FOR POWER CIRCUIT BREAKERS AND SAFETY STANDARDS AVAILABLE THIS MONTH

ELECTRICAL engineers and users of electrical equipment will find the new standards available from the American Standards Association this month of special interest. Up-to-date American Standards for alternating-current power circuit breakers, completed this year following a four-year trial period, include a definite standard which provides definitions and ratings, as well as supplementary standards, one of which covers the procedure for testing. Performance requirements for linemen's protective equipment are given for the first time in five new American War Standards. Protection of workers using chemicals is the purpose of the new Specifications for Chemical-Resistant Gloves, and protection of workers in general of the new Safety Color Code.

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.....	Z38.7.16		**Method for Determining Resolving Power of Lenses** for Projectors for 35-mm Slidefilm and 2- x 2-Inch Slides, Proposed Amercian Standard	.10
.....	Z52.41-1945 (Revised Edition)		**Sizes of Projection Screens** (American War Standard)	.10
.....	Z53.1-1945		**Safety Color Code** for Marking Physical Hazards and the Identification of Certain Equipment (American War Standard)	.25

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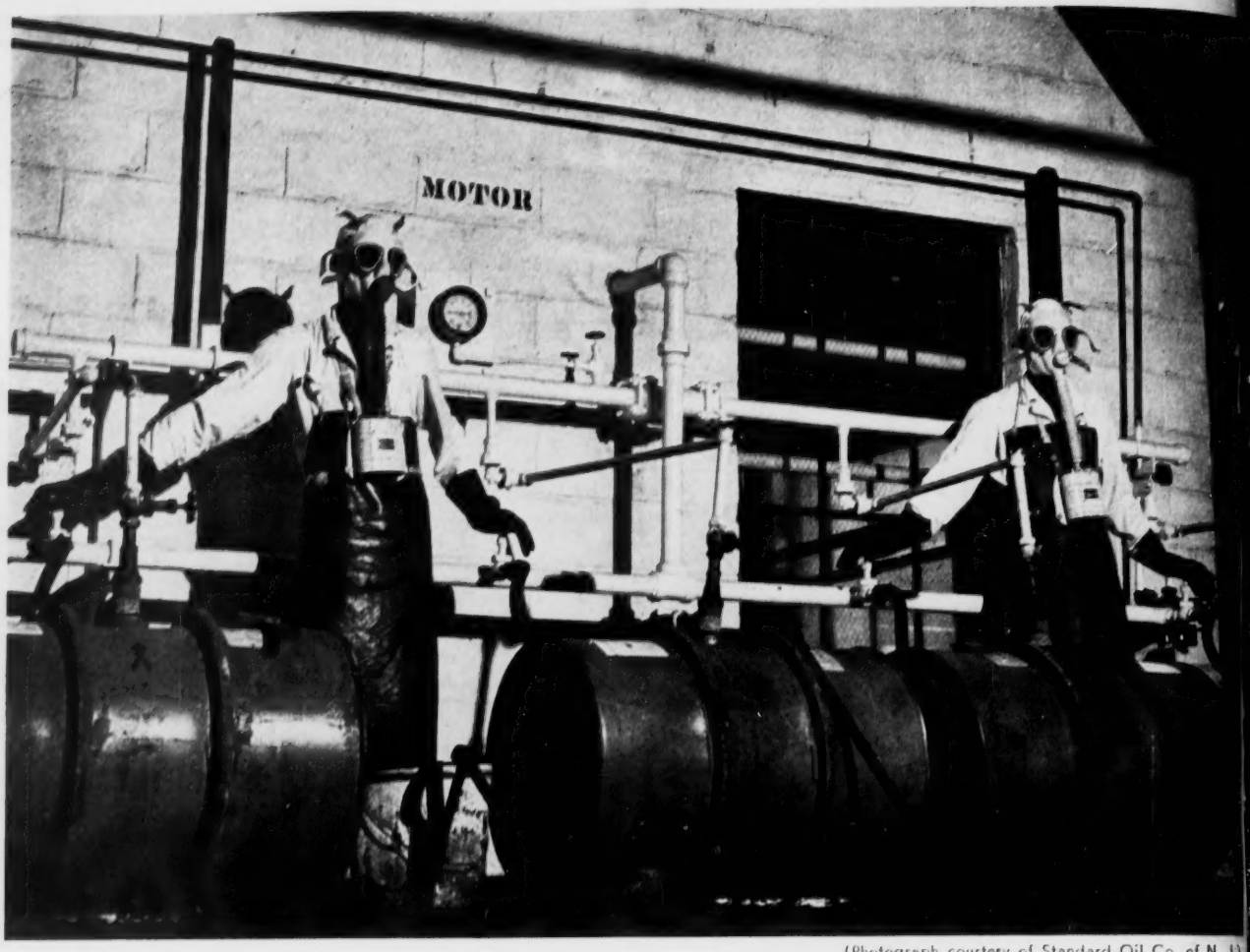

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